Technical Support:

Tel: 01384 489200
Email: ambiradgroupsupport@tnb.com

INSTALLATION & SERVICING MANUAL FOR BENSON VARIANTE² TUBULAR HEATER

NATURAL GAS (G20 I_2H), PROPANE GAS (G31 I_3P)



WARNINGS

Benson equipment must be installed and maintained in accordance with the relevant provisions of the Gas Safety (Installations and Use) Regulations 1998 for gas fired products. Due account should also be taken of any obligations arising from the Health and Safety at Works Act 1974 or relevant codes of practice. In addition the installation must be carried out in accordance with the current IEE wiring regulations (BS 7671), BS 6896 (Industrial & Commercial) and any other relevant British Standards and Codes of Practice by a qualified installer. All external wiring MUST comply with the current IEE wiring regulations.

AmbiRad Limited, Fens Pool Avenue, Brierley Hill, West Midlands, DY5 1QA

IMPORTANT NOTICE TO INSTALLERS

Installers should satisfy themselves that the gas pipework installation is carried out in accordance with all current legislation, Codes of Practice and recommendations .

Additionally it may be necessary to protect the gas valves which form part of the heater or burner assembly from potential pipe contamination particularly, but not exclusively , where copper gas pipework is used.

In instances where copper pipework is to be used for all or part of a gas pipework installation, including short length final connections then we advise that installers consult with gas supplier or provider and satisfy themselves what additional precautions may be necessary

Any reference made to Laws, Standards, Directives , Codes of Practice or other recommendations governing the application and installation of heating appliances and which may be referred to in Brochures, Specifications, Quotations, and Installation, Operation and Maintenance manuals is done so for information and guidance purposes only and should only be considered valid at the time of the publication.

Benson Heating cannot be held responsible from any matters arising from the revision to or introduction of new Laws, Standards, Directives, Codes of Practice or other recommendations.

1.0 Compliance notices

The Benson Variante range of warm air heaters detailed herewith are manufactured by Benson Heating within a strictly controlled environment within the parameters of ISO9001

These instructions are only valid if the following country code is on the appliance **GB. IE.** If this code is not present on the appliance, it is necessary to refer to the technical instructions which will provide the necessary information concerning the modification of then appliance to the conditions of use for the country.

The Benson Variante Range has been independently tested and assessed, and has been found to meet the Essential Requirements of the following European Directives.

Gas Appliance Directive (90 / 396 / EEC)
Machinery Directive (2006/42/EC)
Low Voltage Directive (2006/95/EC)
Electromagnetic Compatibility Directive (2004/108/EC)
Product Liability Directive (85/374/EEC)

The manufacturer has taken reasonable and practical steps to ensure that Benson Variante Range of Heaters are safe and without risk when properly used. These heaters should therefore only be used in the manner and purpose for which they were intended, and in accordance with the recommendations detailed herewith.

The heaters have been designed, manufactured, assembled, inspected, and tested, with safety and quality in mind, there are certain basic precautions which the installer and user should be aware of, and they are strongly advised to read the appropriate sections of the information pack accompanying the heater, prior to installation or use.

Benson Heating supports all new products being supplied to their customers with a comprehensive information pack; this clearly defines mandatory instructions for the safe installation, use, and maintenance, of the appliance (s).

Where proprietary items are incorporated into Benson Heating products, detailed information and instructions are also provided as part of the information pack.

It is the responsibility of the installer, owner, user, or hirer, of such products supplied by Benson Heating, to ensure that they are familiar with the appropriate information manuals, supplied by the manufacturer, and that they are suitably aware of the purpose of the manuals and the safety instructions. In addition, operators must be suitably trained in the use of the appliance so as to ensure its continued safe and efficient use.

Benson Heating has a commitment to continuous improvement, and therefore reserves the right to amend or change the specification of the Variante Heater range subject to agreement from The Notified Body.

Contained within the text of the manual, the words '**Caution'** and **'Warning'** are used to highlight certain points.

Caution is used when failure to follow or implement the instruction(s) can lead to premature failure or damage to the heater or its component parts.
Warning is used when failure to heed or implement the instruction(s) can lead to not only component damage, but also to a hazardous situation being created where there is a risk of personal injury.

The Benson Variante range of heaters conform to the following European Harmonised Standards.

BS EN 1020 Requirements for non domestic gas fired forced convection air heaters for space heating incorporating a fan to assist transportation of combustion air and / or combustion products.

BS EN - ISO 12100-1 & 12100-2
Safety of Machinery - Basic Concepts,
General Principles for Design Part 1 & 2

BS EN 60204 - Part 1
Safety of Machinery - Electrical Equipment

for Machines Specification for General Requirements

BS EN 60335 - Part 1
Safety of Household and Similar Electrical Appliances General Requirements

BS EN 55014
Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electrical tools and similar electric apparatus

BS EN 50165
Electrical Equipment of non-electric heating appliances for household and similar purposes, safety requirements

The Benson Variante range of gas unit heaters meet with the governments criteria in respect of the Enhanced Capital Allowance Scheme

1.1 Certificates of conformity

Declarations and Certificates are available upon request from the Quality Control Department at Benson Heating.

1.2 General product information

The Benson Variante range includes for 10 model sizes with outputs from **12.0** kW to **144.0** kW,

Each model can be configured for use as axial fan crossflow (VRA) centrifugal fan (VRC) and axial fan downflow (VRE)

Variante heaters are suitable for operation on natural gas (G20) or LPG Propane (G31 - On/Off ONLY)
The Model Range is made up as follows:

Model No	**12**	**20**	**30**	**42**	**50**
Output kW	12	19.6	29.4	39.2	49.0
Model No	**60**	**72**	**95**	**120**	**145**
Output kW	58.8	72.0	96.0	120.0	144.0

Variante heaters have been approved for alternative flue discharge arrangements. These are detailed in following page's

Cabinet
Manufactured from electro-zinc coated steel, finished in a durable stove enamelled polyester powder paint.

Heat Exchanger
Manufactured from aluminised dimpled steel tube formed into a W shape to give enhanced efficiency .

Flue / Combustion Air Spigot
Each heater is fitted with two spigots both of which are located to the rear or top* of the appliance. One of the pair is for connection for the flue whilst the other is a screened combustion air intake.
* specified at time of ordering.
WARNING
(SEE FLUE INSTALLATION 2.5)

Burner
The induced draught multi burner assembly is manufactured from aluzinc coated steel and mounted to a common steel manifold which can be easily withdrawn through the burner access compartment.

Burner Control
The heaters are fitted with automatic ignition for all models within the range.

Exhaust Fan
Combustion gases are evacuated to atmosphere via an in built power flue venter fan which is safety interlocked to the gas valve via an air pressure proving device

Air Movement Fan
VRA / E) are supplied with an Axial fan for free blowing applications .
Variante (C) are supplied with Centrifugal fans suitable for ducted applications

Note:
Neither asbestos nor soft soldered joints are used in the construction or manufacture of the Benson VRA/C/E range of Heaters.

The materials selected for use can withstand the mechanical, chemical, and thermal stresses which they will be subject

to during foreseen normal use when installed in accordance with the manufacturers recommendations.

1.3 General Requirements

Caution

Before installation, check that the local distribution conditions, nature of gas and pressure, and the current state adjustment of the appliance are compatible.

Warning

Unauthorised modifications to the appliance, or departure from the manufacturers guidance on intended use, or, installation contrary to the manufacturers recommendations may constitute a hazard.

Note

To ignore the **warning** and **caution** notices, and to ignore the advice from the manufacturer on installation, commissioning, servicing, or use, will jeopardise any applicable warranty, moreover, such a situation could also compromise the safe and efficient running of the appliance itself, and thereby constitute a hazard.

This appliance must be installed by a competent person and in accordance with European, National, and Local criteria, including any relevant standards, codes of practice the requirements of the current building Regulations (and in particular parts J & L), Health and safety regulations IEE regulations and any requirements of the local Authority, Fire Officer or insurers.

Relevant standards may include BS6230, BS6891 and BS5588 parts 2 and 3

Prior to installation the following points should be considered;

a) The position of the heater for the optimum efficient distribution and circulation of warm air

b) The position of the heater relative to the route of the flue

c) The position of the heater relative to the supply of gas

d) The position of the heater relative to the electrical services, wiring routes, and if appropriate, any additional controls.

e) The position of the heater relative to the supply of fresh air

f) The position of the heater relative to potential stratification / circulation problems, which generally occur at higher levels and which may be overcome through the provision of a suitable de-stratification unit.

g) The position of the heater relative to service and maintenance requirements

Caution

The heater **must not** be installed within an area where the conditions are unsuitable, e.g. where the atmosphere is highly corrosive, has a high degree of salinity, or where high wind velocities may affect burner operation. Suitable protection should be provided for the appliance when it is located in a position where it may be susceptible to external mechanical damage from; for example, fork lift trucks, overhead cranes etc.

1.4 Delivery and pre-installation checks

The heater is supplied wrapped in heavy duty protective polythene, mounted on a pallet.

On receipt of the heater, the following checks should be carried out;

a) The model is as per order

b) That it is undamaged

c) That it is suitable for the gas supply and pressure

d) That it is suitable for the electrical supply

If any of these points are not satisfied then contact should be made with the Sales Office at Benson Heating as soon as possible by telephoning 01384 489200. In the case of claims for damage, this must be reported in writing within 24 hours of delivery, in order to comply with insurance criteria

1.5 Warranty

The heater is supplied with a 1 year parts and labour warranty and a further year on all parts excluding consumable’ s.

In addition to this there is also a 10 year time related warranty on the combustion chamber.

The warranty commences from the date of dispatch from the manufacturer, and is subject to the terms detailed within the Benson Heating 'conditions of business'.

Note (i)

The warranty may be invalidated if -

a) The installation is not in accordance with the general requirements of this manual.

b) The flue arrangement and air supply for the heater are not in accordance with the manufacturers recommendations, codes of practice, or similar standards

c) Air flow through the heater is not in accordance with the manufacturers technical specifications.

d) Internal wiring on the heater has been tampered with or unauthorised service repairs undertaken.

e) The main electrical supply input to the heater has been interrupted during the heating mode.

f) The heater has been subject to and affected by the ingress of water in any form

g) The heater is not operated at the rating(s) laid down in the manufacturers technical specifications.

h) The heater has not been operated or used within the normal scope of its intended application.

i) The manufacturer's recommended minimum service requirements have not been complied with.

Note (ii)

All warranty claims must contain the following information to enable processing to take place;

(1) Heater model

(2) Heater serial number

(3) Order reference/date of order, together with full installation details (name and address)

(4) Details or symptoms of fault

(5) Installers name and address.

Faulty parts must be returned to the Benson Heating Spares Department, the address of which is provided on the cover of this manual. Any such parts will undergo inspection to verify the claim. Replacement parts supplied prior to this may be charged, and a credit supplied upon subsequent validation of the warranty claim.

Consumable items are specifically not included within the scope of the warranty.

Note (iii)

Notification is required immediately a fault is suspected.

The manufacturer will not accept responsibility for any additional damage that has been caused, expense incurred, or consequential loss resulting from any failure of the heater(s).

1.6 SPECIAL RISK AREAS

Where it is proposed to install a heater within a special risk area (e.g. an area containing flammable vapours where petrol engined vehicles are stored parked or serviced where paint spraying occurs, or where woodworking machinery or other flammable dust creating process's are employed then restrictions, additional regulations concerning the heater flue wiring or controls may apply.

It is strongly recommended that you contact Benson Technical before installation.

Caution

When used in room sealed mode it may be possible to install Variante heaters in areas containing flammable vapours, high levels of airborne dust combustible dust chlorinated or halogenated hydrocarbons degreasing solvents styrenes other laminating materials or airborne silicones. Benson Technical should be contacted before installation.

Failure to do so may invalidate or reduce guarantee cover.

Plant Room Siting

Provided certain criteria are met it is possible to install VRC (centrifugal fans) within a plant room heaters installed in plant rooms should only be configured for use in room sealed mode and provision should be made for the positive connection of flues , combustion air pipes, warm air discharge and return ductwork where such a siting is a requirement it is recommended that you consult Benson Technical prior to installation.

Additionally the maximum temperature within the plant room should not exceed 32°C

2.0 Installation

The location chosen for the heater must allow for the fitting of an effective flue system.

The location must also allow for adequate clearance for the air supply, return air circulation, gas supply, electrical supply, whilst also providing good and safe working access.

The heater must be installed so that it is level, supports for the heater must be sufficiently robust to withstand the weight of the heater and any ancillary equipment.

Any combustible material adjacent to the heater or flue system must be so placed or shielded so that its surface temperature does not exceed 65°C. Generally a free blowing heater should be located at a height (measured from floor level to the base of unit) as detailed within section 2.1

VRA free blowing heaters are at their most effective when located as close to the working area as possible. However care should be exercised to avoid directing the discharged air directly onto the occupants of the area to be heated.

Where the passage of cold air causes problems (e.g. by entrances, loading bays etc) it is considered favourable if the heater is positioned so as the discharge towards or across the cold air source from a distance from 1.5m - 6m dependent upon the size of the entrance and the air throw characteristics of the heater. On exposed walls heaters should be positioned so as to discharge towards, or along the length of the exposed wall.

In areas where it is proposed that more than one heater is to be installed, a general scheme of circulation should be drawn up and maintained, thereby offering the best heat distribution. Air pressure within the area heated and the outside air pressure must remain the same, factors influencing this would be the presence of extraction systems, ventilation systems, and various types of process plant.

VRA heaters are only suitable for free blowing applications or where the duct length does not exceed 2 metres.

In which case the cross-section of the duct must be at least the same as that of the heater discharge grille

VRE heaters configured for down flow applications should be suspended centrally over the area into which the warm air is to be discharged .

2.1 Installation Mounting Heights and Clearances

The Heater must be installed within the mounting heights indicated below

The following heights in metres.

Model VRA/C	**12**	**20**	**30**	**42**	**50**
Min	1.8	1.8	2.0	2.0	2.4
Max	2.5	2.5	3.2	3.2	4.0
Model VRA/C	**60**	**72**	**95**	**120**	**145**
Min	2.4	2.4	2.4	2.4	2.4
Max	4.0	5.0	5.0	5.0	5.0

Model VRE	**12**	**20**	**30**	**42**	**50**
Min	3.5	4.0	4.0	4.0	5.0
Max	4.5	5.5	6.0	7.0	8.0
Model VRE	**60**	**72**	**95**	**120**	**145**
Min	5.0	5.0	6.0	6.0	6.0
Max	12.0	8.0	10.0	12.0	12.0

Clearances VRA in mm

Model	12	20	30	42	50	60	72	95	120	145
Above	300	300	300	300	300	300	300	300	300	300
Below	300	300	300	300	300	300	300	300	300	300
Right side	250	250	250	250	250	250	250	250	250	250
Left side	800	800	800	800	800	800	950	950	950	950
Rear	300	350	400	500	500	560	560	560	560	630

Clearances VRC in mm

Model	12	20	30	42	50	60	72	95	120	145
Above	300	300	300	300	300	300	300	300	300	300
Below	300	300	300	300	300	300	300	300	300	300
Right side	250	250	250	250	250	250	250	250	250	250
Left side	800	800	800	800	800	800	950	950	950	950
Rear	200	200	200	200	200	200	200	200	200	200

Clearances VRE in mm

Model	12	20	30	42	50	60	72	95	120	145
Above	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Below	4000	4000	4000	4000	5000	5000	6000	6000	6000	6000
Right side	250	250	250	250	250	250	250	250	250	250
Left side	800	800	800	800	800	800	950	950	950	950
Rear	250	250	250	250	250	250	250	250	250	250

Left hand side = burner compartment side

2.2 Heater Mounting

The heater and flue must be adequately supported by one of the following methods ;

a) Suspension by steel drop rods or straps from the **M10** fixing points located on top of the heater.

These must be of sufficient strength to safely carry the weight of the unit and ancillary equipment. The straps may only drop vertically to eyebolts, if used; **I.E**. They must not be joined to the eyebolt at an angle to the vertical, and eyebolts if used should be of an approved type.

b) VRA heaters can be mounted on specifically designed cantilever wall or vertical stanchion brackets which locate directly to the four **M10** fixings on the heater casing.

Alternatively VRA or VRC units can be mounted on cantilever type wall brackets however consideration must be given to ensure that the bracket is large enough to support the heater whilst providing the necessary clearances

In either case the installer should ensure that the wall wall fixings or other support medium is capable of supporting the weight

c) On a level non-combustible surface capable of adequately supporting the weight of the unit and ancillary equipment .

2.3 Warm Air Circulation

The air heater should be positioned to enable maximum circulation of discharged warm air within the area to be heated, whilst taking account of personnel within the area, sources of cold air ingress, and obstructions.

Ensure louvres are adjusted outwards and ensure blades are not resonating

The air temperature rise on passing the heat exchanger is typically around 34° C

A full and unobstructed return air path to the air heater must be provided (see 2.4 Air Supply).

Where the heater is positioned to deliver blown air through an opening in a wall, return air intakes should be located so that they cannot become blocked. Similarly these intakes must be positioned so as not to draw in odours, fumes, hazardous vapours or particles.

2.4 Air Supply for Combustion and Ventilation

Consideration must be given to the provision of air for the purposes of combustion and ventilation of the heated space, plant room or enclosure where the heaters are to be installed .

It is strongly recommended that BS 6230 is referred to for further information concerning ventilation requirements.

2.4.1 Heaters installed within the heated space

Where heaters are installed within the heated space (i.e. not a plant room , or enclosure) then

Combustion air or heater related ventilation air **will not be** required if -

- The heaters are installed in room sealed mode (ie with a positive connection to atmosphere of both flue and combustion air)

OR

- If the design air change rate of the heated space is 0.5 air changes per hour or greater

The design air change rate may be satisfied by natural infiltration or by mechanical ventilation.

Combustion air ventilation **will be** required if

- The heater(s) are installed with flue only (ie without the positive connection to atmosphere of a combustion air duct)

And

- The design air change rate of the heated space is less than 0.5 air changes per hour

Where heater(s) are installed without the positive connection of combustion ductwork within a heated space where air change rate of that heated space is less than 0.5 air changes per hour then it will be necessary to provide either natural ventilation openings to the heated space (Section 2.4.1.1 refers) or the mechanical ventilation of the heated space (Section 2.4.1.2 refers)

2.4.1.1 Natural Ventilation Openings to the Heated Space

If the heater(s) are to be installed without the positive connection of combustion air ductwork within a heated space, and where the design air change rate of that heated space is less than 0.5 air changes per hour, then provision for low level natural ventilation openings only will be necessary.

The minimum free area of the low level natural ventilation opening shall be

- 2 cm^2 for each kW of rated heat input

The low level natural ventilation opening should be situated on an external wall and be within 1000 mm of floor level for natural gas and ideally at floor level for lpg gas installations but in any event no higher than 250 mm.

The table that follows provides specific data for each heater model as -

MODEL	Minimum Free Area Of Ventilation Opening	
	High Level	Low Level
	cm^2	cm^2
12	None	26
20	None	43
30	None	64
42	None	86
50	None	107
60	None	128
72	None	158
95	None	211
120	None	263
145	None	315

2.4.1.2 Mechanical Ventilation to the Heated Space

In the event that the heater(s) are to be installed without the positive connection of combustion ductwork within a heated space and where that heated space has a design air change of less than 0.5 air changes per hour and that the installer prefers to mechanically ventilate the heated space rather than provide ventilation openings then

- The heated space needs to be mechanically ventilated so that the design air change is 0.5 air changes per hour or greater.

- It is a requirement that the mechanical ventilation shall be of the ! Input ! Type with either natural or mechanical extraction

- Systems of mechanical extraction with a natural inlet shall not be used

- It is necessary to provide an automatic means to safely inhibit heater(s) operation should mechanical air supply fail for any reason

2.4.2 Heaters Installed within a Plant Room or Enclosure

A plant room means a room housing the heater plant and probably other items of building service plant and would generally have generous space for maintenance.

An enclosure is where the heater is installed within a compartment or confined area where space is limited.

Where heaters are installed within a plant room or enclosure then provision for both combustion air and / or air for general ventilation will be required by means of high and low level ventilation openings (sections 2.4.2.1 and 2.4.2.2 refer to plant room applications and sections 2.4.2.3 and 2.4.2.4 refer to enclosure applications).

Alternatively the plant room or enclosure may be mechanically ventilated (section 2.4.2.5 refers)

2.4.2.1 Natural Ventilation Openings to Plant Rooms for Room Sealed Heaters

For plant room applications the minimum free area of ventilation opening will depend upon whether the heater(s) is installed in room sealed mode (ie with a positive connection to atmosphere of both flue and combustion air).
Or with flue only (ie without the positive connection to atmosphere of a combustion air duct)

Where the heater(s) is installed in a plant room and in room sealed mode (ie with a positive connection to atmosphere of both flue and combustion air) the minimum free area of ventilation opening needs to be

- At high level 5 cm^2 for each kW of rated heat input

- At low level 5 cm^2 for each kW of rated heat input

The high level ventilation opening should be sited on an external wall and positioned as high as is practical and always within the top 15% of the wall height

The low level natural ventilation opening should be situated on an external wall and

be within 1000 mm of floor level for natural gas and ideally at floor level for l.p.g gas installations but in any event no higher than 250 mm.

2.4.2.2 Natural Ventilation Openings to Plant Rooms for Flued Heaters

The table below provides specific data for each heater model as -

MODEL	Minimum Free Area Of Ventilation Opening	
	High Level	Low Level
	cm^2	cm^2
12	65	65
20	106	106
30	160	160
42	213	213
50	267	267
60	320	320
72	394	394
95	527	527
120	656	656
145	787	787

Where the heater(s) is installed in a plant room and in flue mode (ie without a positive connection to atmosphere of combustion air ductwork) the minimum free area of ventilation opening needs to be

- At high level 2 cm^2 for each kW of rated heat input
- At low level 4 cm^2 for each kW of rated heat input

The high level ventilation opening should be sited on an external wall and positioned as high as is practical and always within the top 15% of the wall height

The low level natural ventilation opening should be situated on an external wall and be within 1000 mm of floor level for natural gas and ideally at floor level for l.p.g gas installations but in any event no higher than 250 mm.

2.4.2.3 Natural Ventilation Openings to Enclosures for Room Sealed Heaters

The table below provides specific data for each heater model as -

MODEL	Minimum Free Area Of Ventilation Opening	
	High Level	Low Level
	cm^2	cm^2
12	26	52
20	43	85
30	64	128
42	86	171
50	107	214
60	128	256
72	158	316
95	211	422
120	263	525
145	315	630

For enclosure applications the minimum free area of ventilation opening will also depend upon whether the heater(s) is installed in room sealed mode (ie with a positive connection to atmosphere of both flue and combustion air)

Or with flue only (ie without the positive connection to atmosphere of a combustion air duct)

Where the heater(s) is installed in a plant room and in room sealed mode (ie with a positive connection to atmosphere of both flue and combustion air) the minimum free area of ventilation opening needs to be

- At high level 5 cm^2 for each kW of rated heat input
- At low level 5 cm^2 for each kW of rated heat input

The high level ventilation opening should be sited on an external wall and positioned as high as is practical and always within the top 15% of the wall height

The low level natural ventilation opening should be situated on an external wall and be within 1000 mm of floor level for natural gas and ideally at floor level for lpg gas installations but in any event no higher than 250 mm.

2.4.2.4 Natural Ventilation Openings to Enclosures for Flued Heaters

The table below provides specific data for each heater model as -

MODEL	Minimum Free Area Of Ventilation Opening	
	High Level	Low Level
	cm^2	cm^2
12	65	65
20	106	106
30	160	160
42	213	213
50	267	267
60	320	320
72	394	394
95	527	527
120	656	656
145	787	787

Where the heater(s) is in an enclosure and in flue only mode (ie without a positive connection to atmosphere of combustion air ductwork) the minimum free area of ventilation opening needs to be

- At high level 5 cm^2 for each kW of rated heat input
- At low level 10 cm^2 for each kW of rated heat input

The high level ventilation opening should be sited on an external wall and positioned as high as is practical and always within the top 15% of the wall height

The low level natural ventilation opening should be situated on an external wall and be within 1000 mm of floor level for natural gas and ideally at floor level for lpg gas installations but in any event no higher than 250 mm.

2.4.2.5 Mechanical Ventilation to a Plant Room or Enclosure

The table below provides specific data for each heater model as -

MODEL	Minimum Free Area Of Ventilation Opening	
	High Level	Low Level
	cm^2	cm^2
12	65	130
20	106	212
30	160	320
42	213	426
50	267	533
60	320	640
72	394	788
95	527	1053
120	656	1312
145	787	1574

In the event that the installer prefers to mechanically ventilate the plant room or enclosure rather than provide ventilation openings then -

- The plant room or enclosure needs to be mechanically ventilated at the rate of 4.14 m^3/h of fresh air per kW or rated heat input.
- It is a requirement that the mechanical ventilation shall be of the 'input' type with either natural or mechanical extraction. Where mechanical extraction is selected then the extraction rate should be 5%-10% less than the input rate.
- Systems of mechanical extraction with a natural inlet shall not be used
- It is necessary to provide an automatic means to safely inhibit heater(s)

operation should mechanical air supply fail for any reason

The table below provides specific data for each heater model as -

MODEL	Mechanical Ventilation Rate for Plant Room or Enclosure
	$M^{3/}h$
12	54
20	88
30	133
42	177
50	221
60	265
72	327
95	436
120	543
145	652

2.5 Flue Installation.

An integral flue spigot is fitted to all Variante Air Heaters thereby allowing the flue to connect directly to the heater.

The design of the flue must ensure that it can be disconnected to allow for cleaning and servicing.

All joints should be sealed between the sections.

Warning
It is essential that the products of combustion are flued to the outside of the building.

Each heater must have its own separate flue, with a flue diameter of not less than is detailed in **section 7.2** within this manual.

WARNING
On VRA 60 to 120 installed in flue only option (type B appliance) - a combustion air grille is supplied as standard. This MUST be fitted in place of the combustion air spigot.

On VRA145 ONLY installed in flue only option (type B appliance) - a combustion air grille is supplied as standard. This MUST be mounted on the top of the unit replacing the blanking plate. The blanking plate is then fitted in place of the combustion air spigot.

The flue assembly must comply with all the relevant regulations regarding height and materials, and must terminate with an approved flue terminal.

Care should be taken to ensure that the flue terminal is not situated in a high pressure area, the proximity of buildings and other obstacles which will influence this must be taken into account, preferably at the design stage.

All Variante Heaters are equipped with a built in flue venter fan which prevents the re -circulation of combustion products, consequently an external draught diverter, barometric damper, or anti spillage system must not be installed. Such devices are unnecessary on the BVA/C range of heaters.

Horizontal flue installations:
Distance from heater connection to terminal must not exceed the following length-

12kW 3 Metres
20/60kW 6 Metres
72/145kW 8 Metres.

Each 90° bend corresponds to 1m of flue length.

Each 45° bend corresponds to 0.8 m of flue length.

Flue pipe should be supported at intervals not exceeding 1.8 m.

In order to provide adequate natural draught, the minimum length of horizontal flue must not be less than 1m.

For vertical flue installations the flue should rise vertically where possible bends should not exceed 45° and the number of bends should be kept to a minimum.

Vertical flue installations:
Distance from heater connection to terminal must not exceed 10 Metres.

The temperature of the combustion products can be as high as **170° C** and therefore tend to rise naturally within the flue. Unnecessary bends and restrictions should therefore be avoided.

Provision for the disconnection of the flue for servicing and inspection purposes must also be made.

The position of the flue and its terminal should be such that it does not impair the combustion process. It should terminate in an exposed position so as to allow the free escape of flue gases without risk of their re-entering the building through windows, ventilation ports etc.

The following distances in mm should be observed:

200 below guttering or eaves.

300 from corners or openings (windows doors etc) and from other horizontal terminals on same wall.

1200 from a facing surface.

1500 from another terminal vertically on the same wall.

2000 from ground level.

The heaters must be connected to the flue system supplied by Benson Heating and be capable of withstanding the stresses and loadings associated with normal use.

When designing the flue system the prevention of the formation and entrapment of condensation must be a key consideration.

Horizontal flue should be fitted ensuring a slight gradient approx 2° towards the terminal.

Where condensation is unavoidable traps should be included to encourage the condensates to flow freely to a point from which they may be released, preferably into a gully.

The condensate pipe from the flue to the disposal point must be made from corrosion resistant pipe of not less than 25mm internal diameter.

If the flue passes through a wall, ceiling, or roof made from combustible material then it has to be sleeved so as to provide a minimum of a 25mm void between the exterior of the flue and the internal wall of the sleeve.

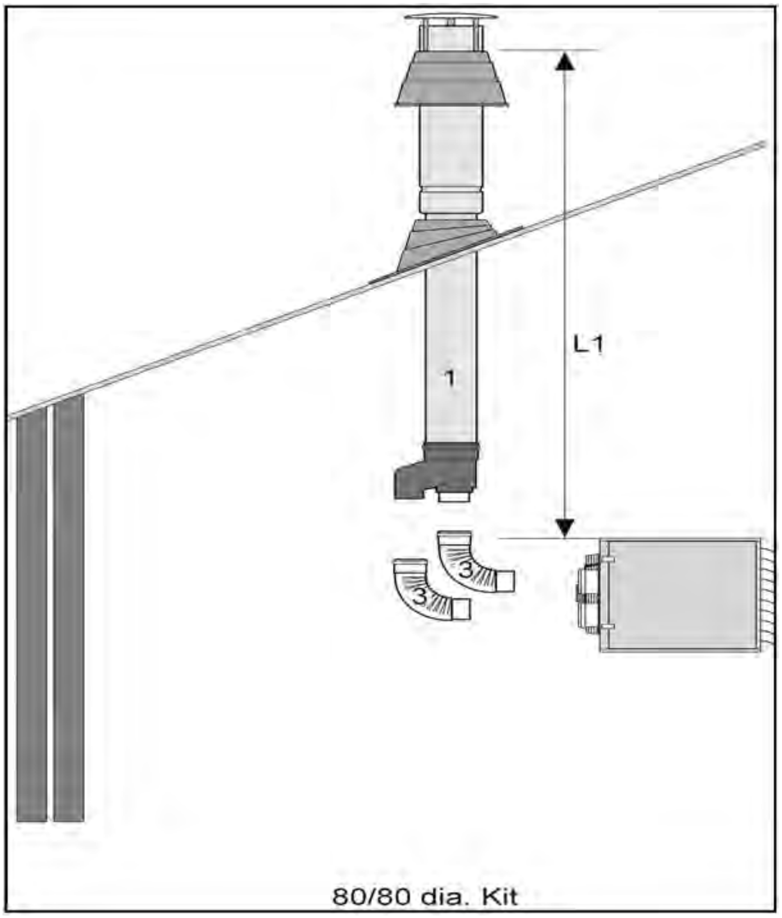
Caution
It is imperative that the flue should be properly sealed where it passes through the roof, this can best be achieved by using the approved method of roof flashing plate and cravat. The flue spigot outlet on all Variante heaters is in horizontal configuration.

Note
It should be noted that claims made under warranty and attributed to the ingress of water may not be considered especially if an approved method of sealing has not been used, or if the design of the flue has not made provision for possible condensation problems.

It is also recommended that BS5854 and BS5440: parts 1 and 2 are used as a consultative document when considering flue requirements.

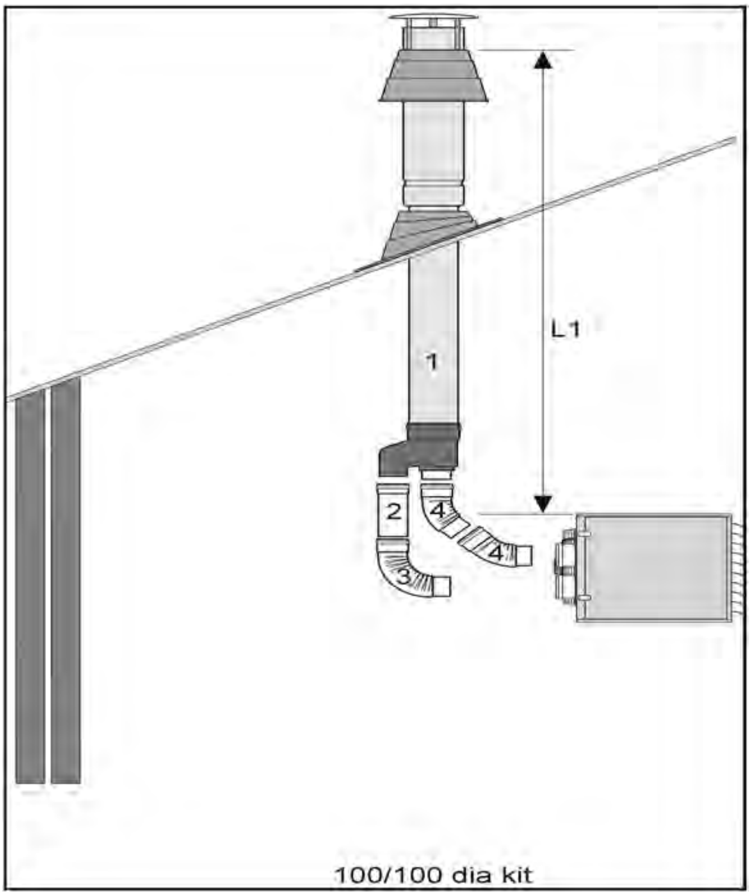
If terminating through a wall only use Benson approved horizontal terminals.

C_{32} Vertical Co axial flue kit options



L1 maximum combined flue length 6 metres	
Kit comprises	Part No
Item (1) Co-axial flue terminal Ø 80 x Ø 80	33-55-010
Item (3) 90^0 by Ø 80 bend x 2	33-54-005
Extra pipes to extend the flue are available as an option	
Pipe Ø 80 x 1000 mm	33-54-001
Pipe Ø 80 x 250 mm	33-54-002
Pipe Ø 80 x 500 mm	33-54-003
Bend Ø 80 x 45^0	33-54-004

C_{32} Vertical Co axial flue kit options



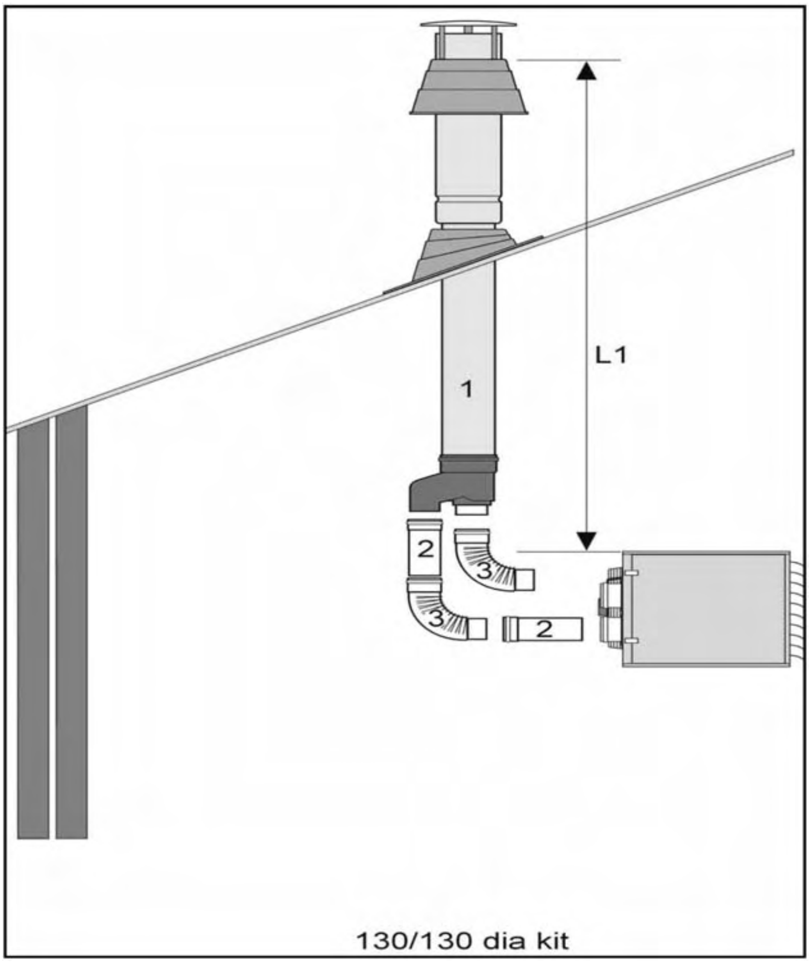
L1 maximum combined flue length 10 metres

	Part No
Kit comprises	
Item (1) Co-axial flue terminal	33-55-107
Item (2) Ø100 x 250 mm pipe	33-54-103
Item (3) 90^0 by Ø100 bend x 1	33-54-105
Item (4) 45^0 by Ø100 bend x 2	33-54-104

Extra pipes to extend the flue are available as an option

Pipe Ø 100 x 1000 mm	33-54-101
Pipe Ø 100 x 500 mm	33-54-102
Pipe Ø 100 x 250 mm	33-54-103

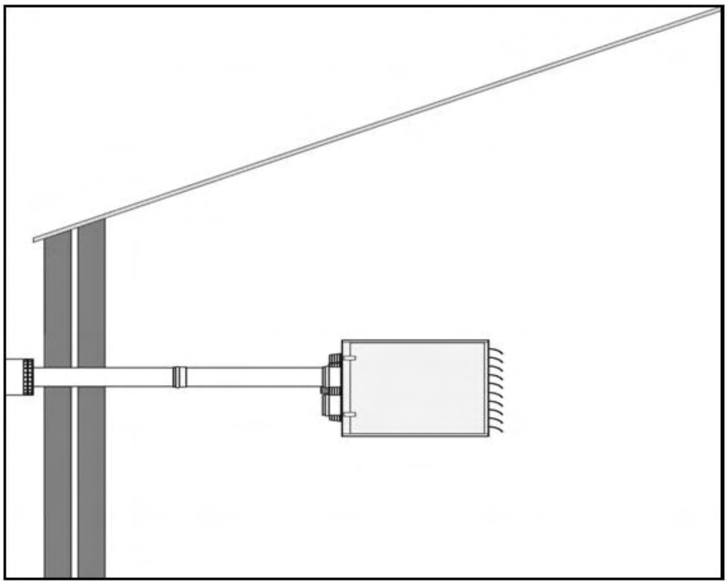
C_{32} Vertical Co axial flue kit options

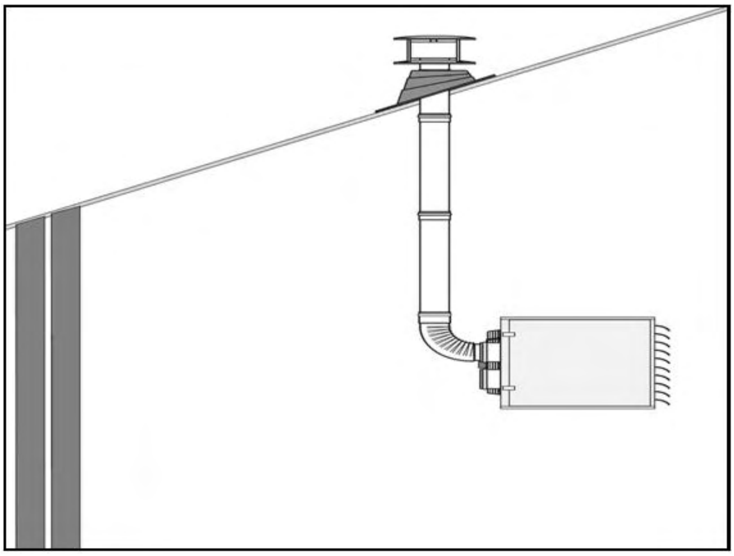


L1 maximum combined flue length 10 metres	
	Part No
Kit comprises	
Item (1) Co-axial flue terminal	33-55-207
Item (2) Ø130 x 250 mm pipe x 2	33-54-203
Item (3) 90^0 by Ø130 bend x 2	33-54-205
Extra pipes to extend the flue are available as an option	
Pipe Ø 130 x 1000 mm	33-54-201
Pipe Ø 130 x 500 mm	33-54-202
Pipe Ø 130 x 250 mm	33-54-203
Bend Ø 130 x 45^0	33-54-204

Option B_{22}

In this configuration the heater is connected to a single flue pipe to discharge the products of combustion outside the building either through the roof or through a wall. The air for combustion is taken from inside the building.



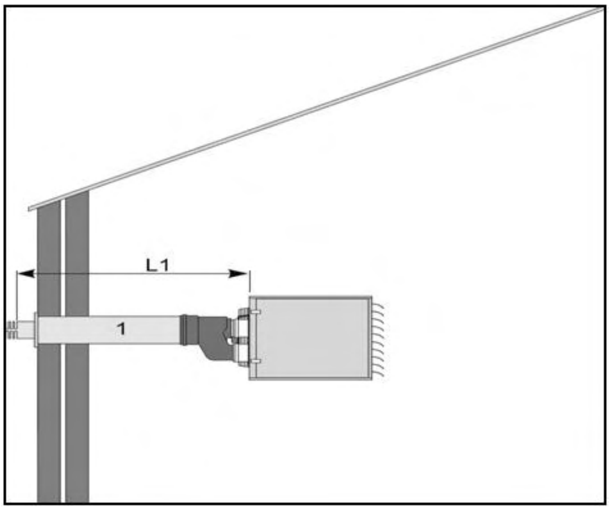


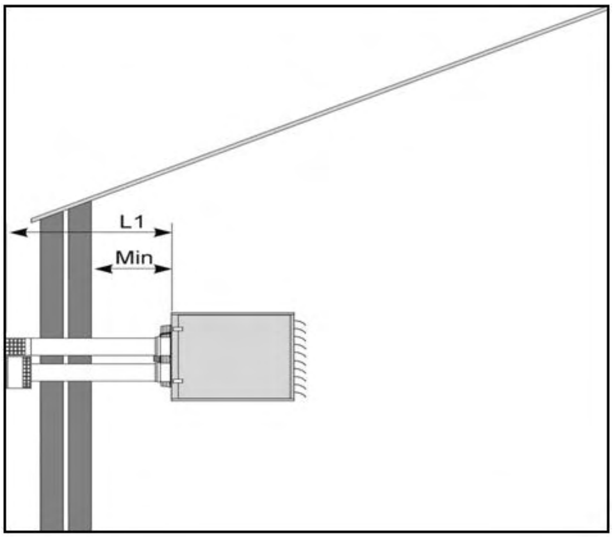
Heater	Unit	Flue Exit	HORIZONTAL	Flue Exit	VERTICAL
		MIN.	MAX.	MIN.	MAX.
12	m	1,00	3,00	1,00	5,00
20	m	1,00	6,00	1,00	10,00
30	m	1,00	6,00	1,00	10,00
42	m	1,00	6,00	1,00	10,00
50	m	1,00	6,00	1,00	10,00
60	m	1,00	6,00	1,00	10,00
72	m	1,00	8,00	1,00	10,00
95	m	1,00	8,00	1,00	10,00
120	m	1,00	8,00	1,00	10,00
145	m	1,00	8,00	1,00	10,00

Option C_{12}

In this configuration the heater is connected to a horizontal flue system discharging the products of combustion and bringing in the combustion air from outside the building in which the heater is located.

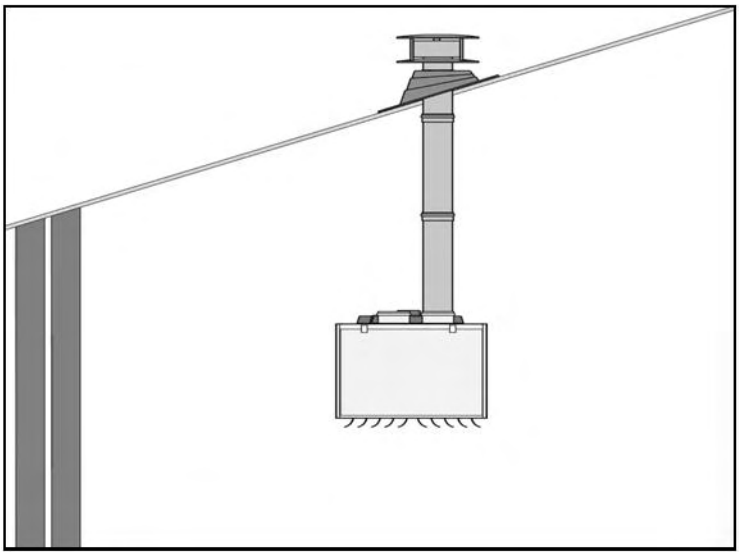
The outlet / inlet must be through the wall and may be made with two separate pipes or with a horizontal coaxial concentric terminal

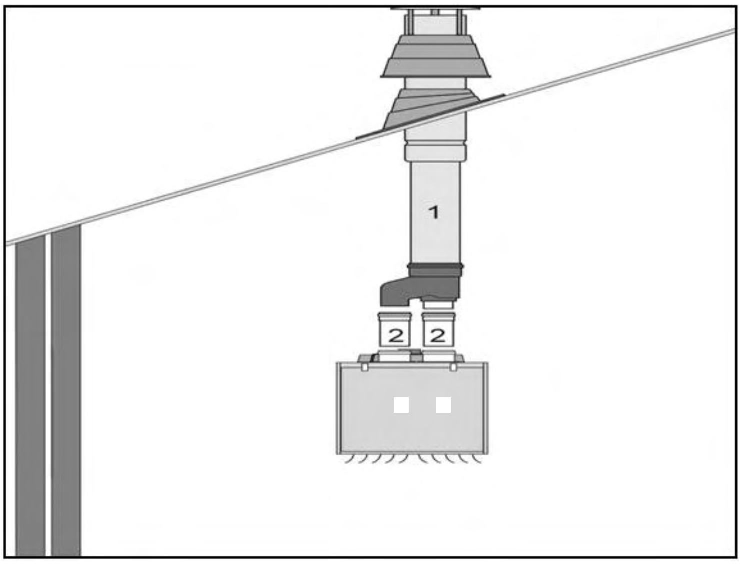




Heater	Unit	Horizontal L1 MIN	Concentric Flue Combined Length L1MAX.
12	m	0.50	3.00
20	m	0.50	6.00
30	m	0.60	6.00
42	m	0.70	6.00
50	m	0.85	6.00
60	m	1,0	6.00
72	m	0.7	8.00
95	m	0.85	8.00
120	m	1,05	8.00
145	m	1,20	8.00

VRE Flueing options B_{22} Single pipe flue only and C_{32} Vertical coaxial





Heater	Unit	Flue Exit	Vertical Co/Axial Combined length	Flue Exit	VERTICAL
		MIN.	**MAX.**	**MIN.**	**MAX.**
12	m	1,00	3.00	1,00	5,00
20	m	1,00	6,00	1,00	10,00
30	m	1,00	6,00	1,00	10,00
42	m	1,00	6,00	1,00	10,00
50	m	1,00	6,00	1,00	10,00
60	m	1,00	6,00	1,00	10,00
72	m	1,00	8,00	1,00	10,00
95	m	1,00	8,00	1,00	10,00
120	m	1,00	8,00	1,00	10,00
145	m	1,00	8,00	1,00	10,00

2.6 Electrical Installation

All electrical wiring and connections must be in accordance with the relevant European, National, and Local regulations as well as to IEE Standards.

Ensure that the Electric and Gas supplies are turned off before any electrical work is carried out on the heater.

Also ensure that wiring cannot make contact with any metal surfaces liable to be subject to high temperatures, and where insulation of the wiring could be impaired as a result of such contact.

All Variante models must be earthed.

Warning:
Ensure that the electrical supply is compatible to the heater.
<u>ALL HEATERS ARE NEUTRALLY RESET</u>

Caution
The main electrical supply must not be switched off or disconnected as a method for stopping the heater, the exception to this is in the event of an emergency, or when the heater has been allowed to cool sufficiently to prevent any damage from being sustained to the heater or its controls (ie: during servicing).

Claims for damage will not be considered if they have resulted from incorrect wiring or the incorrect use of the heater.

Each heater requires a permanent 230V 50Hz 1ph / 415V/3ph/50Hz electrical supply, which must be wired through a fused isolator fitted with a fuse of the correct rating.

Wiring diagrams are also detailed within this manual, (section 6.0).

The electrical supply isolator should be mounted adjacent to the air heater in an easily accessible position to allow for servicing isolation, or emergency shut off.

Electrical panel

Warning
Ensure that the mains isolator is turned **OFF** before undertaking any electrical work on the heater. Access to the electrical panel is gained by opening the right hand heater side panel.

Warning
Ensure that all connections are secure and that there are no loose strands which could bridge across the terminals.

A minimum conductor size of 1.0 mm (diameter) is required.

Caution
When using the SmartCom or Optimised Controller Consideration should be made when routing the cable between the control and heater. Avoiding where possible any existing cables and switch gear as any induced voltage may affect the operation of the sequential control box within the heater.

It is recommended that screened cable is used when the control is to be sited more than 10 metres away from the heater

One electrical panel per heater is required, unless heaters are specified for multiple heater control applications. On no account should more than one heater be connected to a single time switch or thermostat.

The only exception to this is when a control panel suitable for multiple heater applications is supplied by the manufacturer.

Any ancillary electrical items e.g. room thermostats , time switches, remote panels etc, must be wired into the heater electrical circuit in accordance with the diagrams provided.

Note
When external controls operate to switch the heater **OFF**, power to the heater should remain to allow the fan to continue to operate to sufficiently cool the heater thereby preventing damage to the heat exchanger.

Fan Control Relay

The fan control switch features normally open 230V contacts, and is wired to control the live supply to the fan motor. When the circuit is made the fan will switch on. When the thermostat or time switch shuts down the burner, the fan will continue to run until the thermal switch has cooled sufficiently to prevent the residual heat from damaging the heater or its controls.

On start up the fan delay prevents air being circulated until the desired temperature is achieved. On

Limit Control

A high temperature manual reset limit control.

On models with two fans a second limit control is situated inside the right side panel and is wired in series. Operation of either switch will shut down the heater.

If these controls require resetting the cause should be determined and rectified immediately.

Caution
The power supply to the fan must not be interrupted, the only time when power supply can be disconnected or interrupted is during servicing or in emergencies.

If there is a requirement for the heater to be switched off over night then the gas valve circuit should be opened via a time switch, etc, as per the wiring instructions and diagrams supplied within section 6.0 of this manual.

2.7 Gas installation

Warning:
Please read notice on page 3 of this manual

As there have been recorded instances of the deposition of copper sulphide dust within the valves and orifices of gas appliances as a direct result of a reaction between the hydrogen sulphide contained in some natural gasses and copper pipe we recommend that the heater(s) should not be connected to any natural gas pipe distribution system which utilizes copper pipework, including final connections. Instead steel pipework should be used throughout.

In the event that it is impractical to use steel pipework or where installers are obliged or insist on using elements of copper pipework within the installation then we strongly recommend that the gas supplier be consulted as specific conditions and requirements may be necessary.

The Variante range of heaters are all manufactured and pre set for use with Natural Gas, and all feature 1/2” or 3/4” BSP connection points. Prior to installation the supply characteristics (gas type and pressure) must be checked to ensure that they are in accordance with the data plate on the heater.

The gas supplier should check that the meter and service connection to the heater are capable of delivering the required volume of gas, thereby ensuring that the minimum burner pressure can be achieved.

Consideration should be given to the pressure drop on single and multi heater installations and the effect they may have on other plant sharing the supply.

If it is necessary to fit a gas pressure booster, the controls must include a low pressure cut off switch which must be fitted on the supply / inlet side of the booster. It is also a requirement that the gas supplier is advised prior to the installation or fitting of the booster.

Each heater supply must be fitted with a separate isolating cock positioned adjacent to and upstream of the union which must be sited outside the heater.

The isolating cock should be of the 90° turn type and should be clearly marked **OPEN / CLOSED** it should also be installed so as to fall to the closed position.

An approved gas jointing compound must be used on all joints and unions and the system purged and tested for soundness prior to final connection.

The connection to the heater can be made by way of either an approved flexible coupling or rigid connection . Threaded connections must comply to ISO 288/1 or ISO 7/1 further information concerning accepted European practice is detailed in BS EN1020.

The diameter of the pipework from the isolating cock to the burner must not be less than the diameter of the connection into the multiblock.

Note
Reference to The Institute of Gas Engineers publications Utilisation Procedures IGE/UP1 and IGE/UP2 together with reference to BS6891 is strongly advised.

3.0 Commissioning

Note
It is a requirement that only suitably qualified and competent personnel are allowed to undertake the commissioning of the heater.

It is also strongly recommended that prior to commissioning the engineers familiarises themselves with the heater. the specific requirements of the installation / application, and the information contained within the manual.

Warning
All heaters are subject to a rigorous test programme prior to despatch, whilst such a programme does involve pre-commissioning and the setting of the heater to operate efficiently and within its designed operational limits this does not mean that the function of thorough on site commissioning is less important.

It is strongly recommended that the equipment used for the sampling and analysis of the flue gases is accurate to within +/- 0.1% and maintained so that it is regularly calibrated.

The following pre-commissioning checks should be undertaken, having first ensured that the gas and electrical supplies are turned off.

(a) Check that all panels and fasteners are secure and in place.
(b) Check that the heater is mounted safely.
(c) Check that the flue is sealed, secured, and adequately supported.
(d) Check that the fan is free to rotate, that the fan is secured to its shaft, and that the guards and fan assembly are all in place and properly secured.
(e) Check that the heater is installed so that it is not tilted and remains square.
(f) Check that the outlet louvres (Axial heaters) are set to offer minimum resistance to air flow.

3.1 Electrical pre-tests

The electrical safety checks must include the following:

a) Test for earth continuity.
b) Test for resistance to earth.
c) Check live and neutral connections are correct.
d) Check to ensure that when the external controls operate to switch the heater off, power remains to the fan.

3.2 Gas supply pre-test

Ensure that the service pipework has been installed, purged and tested in accordance with the relevant regulations, and that the installation is served by an adjacent isolating cock.

Connection from the supply to the heater must also comply with the relevant regulations (see section 1.0) and must have been purged and soundness tested by an authorised engineer.

3.3 Ignition sequence

PRE START DRY RUN
In order to test that all controls are in good working order, the control sequence should first be tested with the gas supply turned **Off**.
Ensure gas isolating cock is in the **Off** position.

Warning
If during the following sequence of operations the heater fails to operate correctly the fault should be traced and rectified before proceeding, if necessary referring to section 5.0 fault diagnosis.

a) Switch off the main electrical supply to the heater.
b) Turn off gas supply to the heater.
c) Open side panel, and connect manometers to the gas supply test point and to the main burner test point.
d) Ensure outlet louvres are correctly set .
e) Ensure fan. rotation is not impaired or obstructed.
f) Set room thermostat to its lowest setting.
g) If a time switch is fitted ensure it is set to an on period.
h) Switch on electrical supply.
i) Use leak tester to test for soundness on the unions and pipework.
j) Operate the heater through the installed control system.

*On start the signal will activate the flue venter for a pre purge period and in turn will make the air proving switch, once made, the air proving switch will complete the circuit to the control box and after a **30 second Delay** the automatic control should attempt light the burner, because the gas is turned off and flame cannot be established , the control box will go to **LOCKOUT.***

k) Reset the control on completion of dry run.
l) Open gas cock.
m) Operate heater through installed control.

*The flue venter will pre purge the heater and in turn operate an air proving switch which completes the electrical circuit to the control box after a **30 second Delay** the control will open the gas solenoid valve and the main burner will light.*

The flame can be observed at the burner manifold, check that the burner is providing a good flame i.e. even and stable.

n) Check pressure readings on the manometers, and continue to let the heater fire for ten minutes.
o) When the fan starts ensure that the direction of rotation is correct , and that the fan start is within 2 minutes of burner ignition.

Caution
If the fan fails to operate within approximately 2 minutes and the heater goes to overheat it will shut down through breaking the circuit to the gas valve, the cause must be ascertained and rectified before re-ignition.

Once the limit thermostat has tripped out it must be manually reset to allow re-ignition to take place.

p) After ten minutes check burner head pressure is as specification - adjust as necessary by removal of the gas pressure adjustment cover, and using a screwdriver turn the adjustment screw on the governor as follows: Clockwise to increase. Anti clockwise to decrease.

For Hi/Low and Modulation adjustment, refer to the following procedures.

Adjustment of Optional Hi-Low regulator



IMPORTANT

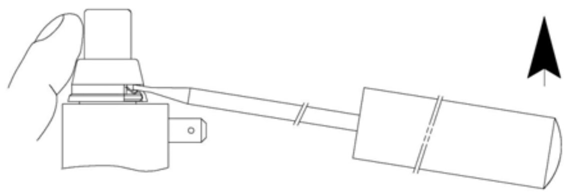
Adjustments should be made by qualified persons only.

If the appliance manufacturer supplies checkout and/or service and maintenance instructions, carefully follow them. If such instructions are not provided, then follow the procedure as outlined below.

Allow time for pressure to stabilize before making adjustments.

It is recommended that the High-Low regulator is operated a few times to ensure correct setting. It should be prevented, that High-Low regulator is exposed to unnecessary forces because of wiring.

Cap has to be removed by putting a small screw driver in one of the slots and lifting the cap carefully while at the same time supporting the cap opposite to the screw driver.



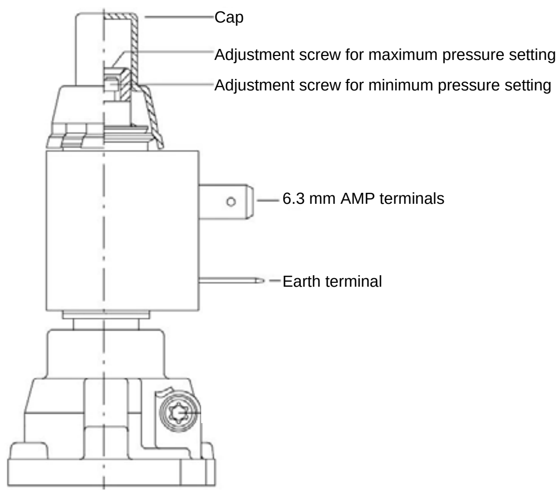
Maximum pressure setting must first be adjusted then minimum pressure setting can be adjusted.

Any adjustment of maximum pressure setting influences minimum pressure setting.

Never adjust the maximum setting above the range specified.

Adjusting maximum pressure setting

- Connect a suitable pressure gauge to pipe line or to outlet pressure tap of gas control concerned, to measure burner pressure (measuring point must be as near to burner as possible).
- Energize High-Low regulator, set gas control in operation and wait until an outlet pressure is recorded on pressure gauge.
- Use a 8 mm wrench to turn adjustment screw for maximum pressure setting clockwise to increase or counter-clockwise to decrease pressure, until desired maximum burner pressure is obtained.
- Check maximum pressure setting after several times.



Adjusting minimum pressure setting

- Connect a suitable pressure gauge to pipe line or to outlet pressure tap of gas control concerned, to measure burner pressure (measuring point must be as near to burner as possible).
- Disconnect electrical connection of High -Low regulator.
- Set gas control in operation and wait until an outlet pressure is recorded on the pressure gauge.
- When minimum pressure setting needs adjustment, then use a 3.5 mm screw driver to turn adjustment screw for minimum pressure setting clockwise to increase or counter-clockwise to decrease pressure, until desired minimum burner pressure is obtained.
- Wire High-Low regulator coil in circuit.
- Check **maximum** pressure setting and re-adjust if necessary. Check minimum pressure setting again.

When High and Low pressure settings are correct, replace cap and connect pressure feedback connection (if applicable).

Checkout
After any adjustment, set appliance in operation and observe through several complete cycles to ensure that burner system components function correctly.

Adjustment of Optional modulation regulator



IMPORTANT
Adjustments should be made by qualified persons only.

If the appliance manufacturer supplies checkout and/or service and maintenance instructions, carefully follow them. If such instructions are not provided, then follow the procedure as outlined below.

Allow time for pressure to stabilize before making adjustments.

It is recommended that the Modureg is operated a few times to ensure correct setting.

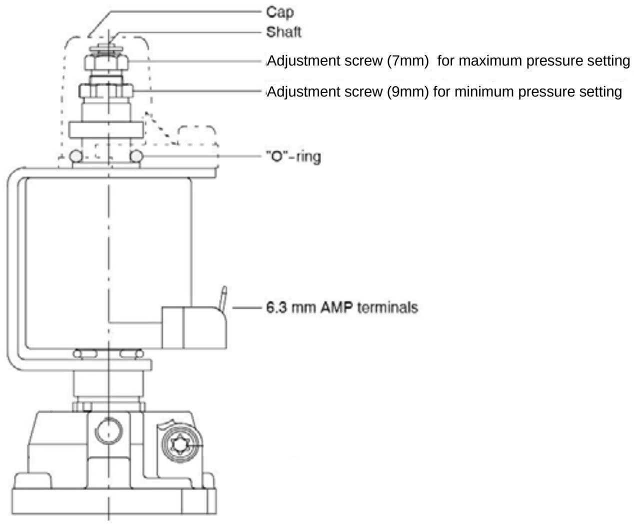
Cap must be removed before any adjustment can be made. Cap can be removed by firstly removing the small retaining screw and lifting the cap carefully.

Take care that after any adjustment cap and O- ring are mounted (if applicable).

The minimum pressure setting must first be adjusted to ensure that burner will safely light up, then maximum pressure setting can be adjusted.

Any adjustment of minimum pressure setting influences the maximum pressure setting.

Adjusting minimum pressure setting
- Disconnect pressure feedback connection (if applicable).
- Connect a suitable pressure gauge to pipe line or to outlet pressure tap of gas control concerned, to measure burner pressure (measuring point must be as near to burner as possible).
- Disconnect electrical connection to Modureg.
- Energize operator, set control in operation and wait until an outlet pressure is recorded on pressure gauge.
- If minimum pressure setting needs adjustment turn the adjustment for minimum pressure setting clockwise for increasing or counter-clockwise for decreasing pressure until the desired minimum outlet pressure is obtained.
- Check that main burner lights easily and reliably at minimum pressure.
- Check maximum pressure setting and readjust if necessary.
- Mount cap and “O” ring and reconnect pressure feedback connection (if applicable).



Adjusting maximum pressure setting
- Disconnect pressure feedback connection (if applicable).
- Connect a suitable pressure gauge to pipe line or to outlet pressure tap of gas control concerned, to measure burner pressure (measuring point must be as near to burner as possible).
- Disconnect electrical connection of Modureg.
- Energize operator, set control in operation and wait until an outlet pressure is recorded on pressure gauge.
- Push the shaft gently downwards to the

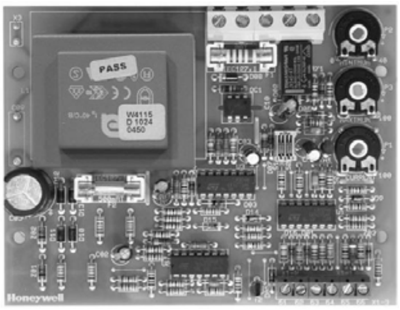
maximum adjustment screw and hold it on.

- If maximum pressure setting needs adjustment turn the maximum rate adjustment screw clockwise for increasing or counter-clockwise for decreasing the maximum pressure, until the desired maximum outlet pressure is obtained. Release shaft.
- Mount cap and "O"-ring and reconnect pressure feedback connection (if applicable).

When maximum and minimum pressure are set, wire Modureg in circuit.

Adjustment of modulation Interface board

IMPORTANT
Adjustments should be made by qualified persons only.



The interface board is a signal conditioner designed for the use in association a Honeywell modulation coil V7335A (Modureg). The purpose is to provide a linear conversion of a low DC voltage or current (produced by measure or control equipment) to a requested control current or voltage for the modulation coil (0-22 V-DC or 30-165 mA-DC).

Characteristics

Input signal
The interface board requires to be powered by a 230 VAC supply voltage.

Following control signals are available:

- 4 - 20 mA-DC with input protection for a continuous 200 mA signal (terminals 64-63).
- 0 - 5 V-DC with input protection for a continuous 35 V-DC signal signal (terminals 64-64).
- 0 - 10 V-DC with input protection for a continuous 35 V-DC signal (terminals 64-66).

Remark : Please ensure that the polarisation '+' and '-' of the control signal is done correctly, otherwise the PCB will in case of a 0-5 V DC control signal not modulate and will even in case of a 0-10 V DC control signal refuse to operate.

Output signal.
The required output signal *can* be obtained by adjusting the selector switches on the printed circuit board.

- For output control signal of one modulation coil V733SA (165mA)

Switch 1: "OFF"
Switch 2: "OFF"

OPERATION

Adjustment & Control signals.
General
A relay with potential free contacts (terminals 5 & 6) incorporated within the interface board, controls the burner relay in the heater. This relay (burner on relay) is triggered each time there is an increase of the control current or voltage (room thermostat function).

Adjustment of the minimum drop-out voltage of burner relay. Potentiometer P2.
The minimum drop-out voltage is controlled by a potentiometer P2, varying between 0 % and 40 % of the input control signal.

Example

- an input control signal of 0 to 10V DC and potentiometer P2 set at 0 % results into a drop-out voltage of 0.3V DC.
- an input control signal of 0 to 10V DC and potentiometer P2 set at 40 % results into a drop-out voltage of 4V DC.

Adjustment of the maximum hold-in voltage of burner relay. Potentiometer P3.
The maximum hold-in voltage is controlled by a potentiometer P3. Its proportional value is added to the P2 setting value.

Example:

- Potentiometer P2 is set at 0 %, and P3 at 5%, the hold-in voltage of the burner relay is adjustable between 5 % and 100 % of the input control signal. So, if input control signal is set at 0 to 10V DC, the hold-in voltage of the relay amounts to 0.5V DC.
- Potentiometer P2 is set at 40 %and P3 at 5%, the hold-in voltage of the burner relay is adjustable between 45 %and 100 % of the input control signal. So, if the input control signal is set at 0 to 10 VDC: the hold-in voltage of the relay amounts 4.5V DC.

Adjustment of the current control. Potentiometer P1

The control current or voltage of one or two Honeywell modulation coils V7335A Modureg is controlled by the potentiometer PI, varying between 50 % and 100 % of the input control signal.

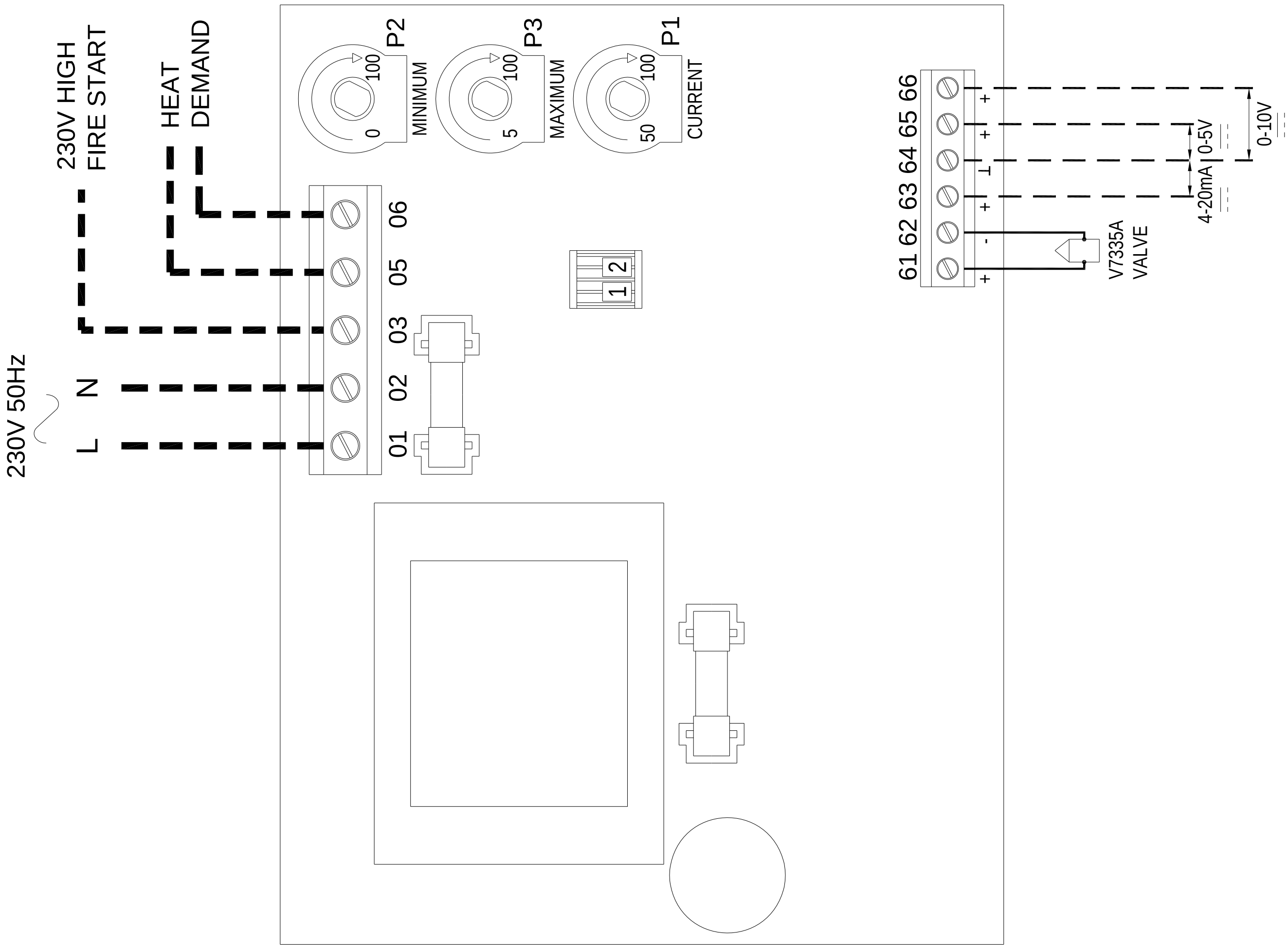
Example:

- Maximum power (165 **mADC** at 22V DC) is provided to the modulation coil with a 10V DC input control signal and P1 set at 100 %
- Maximum power (165mA-DC at 22V DC) is provided to the modulation coil with a 5V DC input control signal and potentiometer PI set at 50 %.

High fire start signal

A maximum control current or voltage is sent to the modulation coil for 10s when a 230V AC line input voltage appears on terminal 3. This 230V AC line input voltage is generated by a contact in the burner relay incorporated within the appliance.

When opening the main gas valve and when ionisation current is sufficient, the 230V AC line input voltage is directed towards terminal 3 of the interface board.



q) Check that the gas pressure remains satisfactory for all appliances on the same circuit.
r) Undertake combustion tests checking CO, CO_2 and efficiency. CO should not exceed (20PPM).
s) Check that the burners are extinguished when the thermostat is set to its lowest setting, and then remove the manometers.
t) Turn the thermostat to its highest setting to re light the burner and replace the adjustment screw cover.

On completion mark the gas valve adjustment screw with paint/sealant to prevent tampering with valve.

u) Turn the thermostat to its lowest setting and shut off the gas supply at the gas control valve, allow the fan to continue to run until the heater is cooled sufficiently for the fan to shut down.
v) Turn off the electrical supply.
w) Close the side panel.
x) Set thermostat to desired setting.
y) Ensure that the user is familiar with the heater and its controls and that the user is satisfied with the commissioning and testing, and that he is aware of the instructions within the manual.

It is strongly advised that the commissioning engineer runs through the lighting, shutdown, and general safe and efficient running of the heater before hand over.

3.4 Hand over

Upon satisfactory completion of commissioning and testing, a record of commissioning information (contact name date etc) should be made in the log book left with the heater by the commissioning engineer together with the user instructions.

At the same time the user should be made aware of the most efficient and economical methods of operation.

The user must be familiar and satisfied with the safety, ignition, shutdown, and general operational procedures.

4.0 Servicing

Warnings
It is a requirement that only qualified personnel are allowed to carry out installation commissioning or servicing.

In addition only spare parts recommended by the manufacturer may be fitted, and the installer should provide a list of recommended spare parts that are available through the manufacturer or his agent (see section 8).

Before commencing any maintenance or servicing work the heater must be shut down and allowed to cool, and have the gas and electric supplies to it turned off at the supply cock and isolator respectively.

Always test for gas soundness after completing any service work particularly if this has necessitated the removal and / or replacement of gas carrying components.

It is advisable that routine inspections are carried out on a frequent basis, servicing must also be carried out regularly, and in accordance with the manufacturers recommendations i.e. at a maximum interval of one year. In certain applications the frequency of servicing will have to be increased, this to a large extent is governed by the working environment, and both the manufacturer and the installer will be able to offer further advice.

A safe working platform giving good access to the heater is required.

Clean all accessible surfaces including the outside of the tubular heat exchanger by removal of the fan assembly and the louvres. Check for panel damage and that all fasteners are present and secure.

Visually check all electrical wiring for signs of damage, possibly through contact with hot surfaces, check conduit for signs of chaffing and for security. Check all terminals are secure and free from escaped / stray conductor strands.

4.1 Servicing procedure - major component parts

Heat exchanger

Carry out visual inspection of the tubular heat exchanger using an inspection lamp and mirror.

Check seams and joints for perforations.

Check for severe corrosion and splits in the heat exchanger.

Check that there are no blockages and that there is not an excessive build up of soot within the heat exchanger.

If required remove the burner manifold allowing access for cleaning, with a flexible flue brush and vacuum cleaner.

Warning If the heat exchanger is found to be perforated the heater must not be fired until a replacement heat exchanger has been fitted.

Injectors and Manifold

Undo the gas pipe connection.

Remove the 6 manifold fixing screws.

Remove the manifold and injector assembly from the right hand side of the heater.

Check that the manifold is straight, the injectors are correctly aligned, and that they are clean, and that there are no contaminates restricting the orifices, if necessary clean carefully with compressed air and or lint free cloth and acetone.

Caution
The injector orifice is precision machined to fine tolerances, do not clean with hard sharp or abrasive instruments. If the injectors have been removed from the manifold, when they are replaced, and care should be taken not to over tighten.

Ensure all joints are gas tight.

Fan and Motor
Check that the fan is secure and rotates freely without excessive play in the shaft.
The fan blades and motor should be cleaned using a soft brush.

The fan and motor assembly can be removed from the heater by first disconnecting the leads from the terminal block and by removing the strain relief bush. The four screws securing the fan and motor assembly to the rear of the plenum can be removed, and the assembly complete with guard can then be removed from the heater.

Limit stats
If the heater has gone into an overheat condition, remove the black dust cover and depress the green button.

On models with two fans a second limit control is situated inside the right side panel and is wired in series. If the heater has gone into an overheat condition, depress the red button.

Flue System
Check that the flue is in good condition, that it is adequately supported, that there are no blockages or restrictions.

Check that any joints are properly sealed preventing an escape of products of combustion.

Check condensate drain if fitted.
.
Check for signs of water ingress and any resultant damage.

Flue Venter
Check that the flue fan is clean and free from any dust deposits.

Differential Air Pressure Switch
Check that the tubes are connected and clear and free from dust.

Check that they are not kinked or damaged.
Check electrical connections are intact.

Test
Test and re-commission as per sections 3.0 to 3.4 inclusive.

Automatic Controls
Automatic control is by way of a Honeywell controller.

Spark Ignition is via an ignition electrode ensure that the ceramic insulation material is not damaged or cracked.

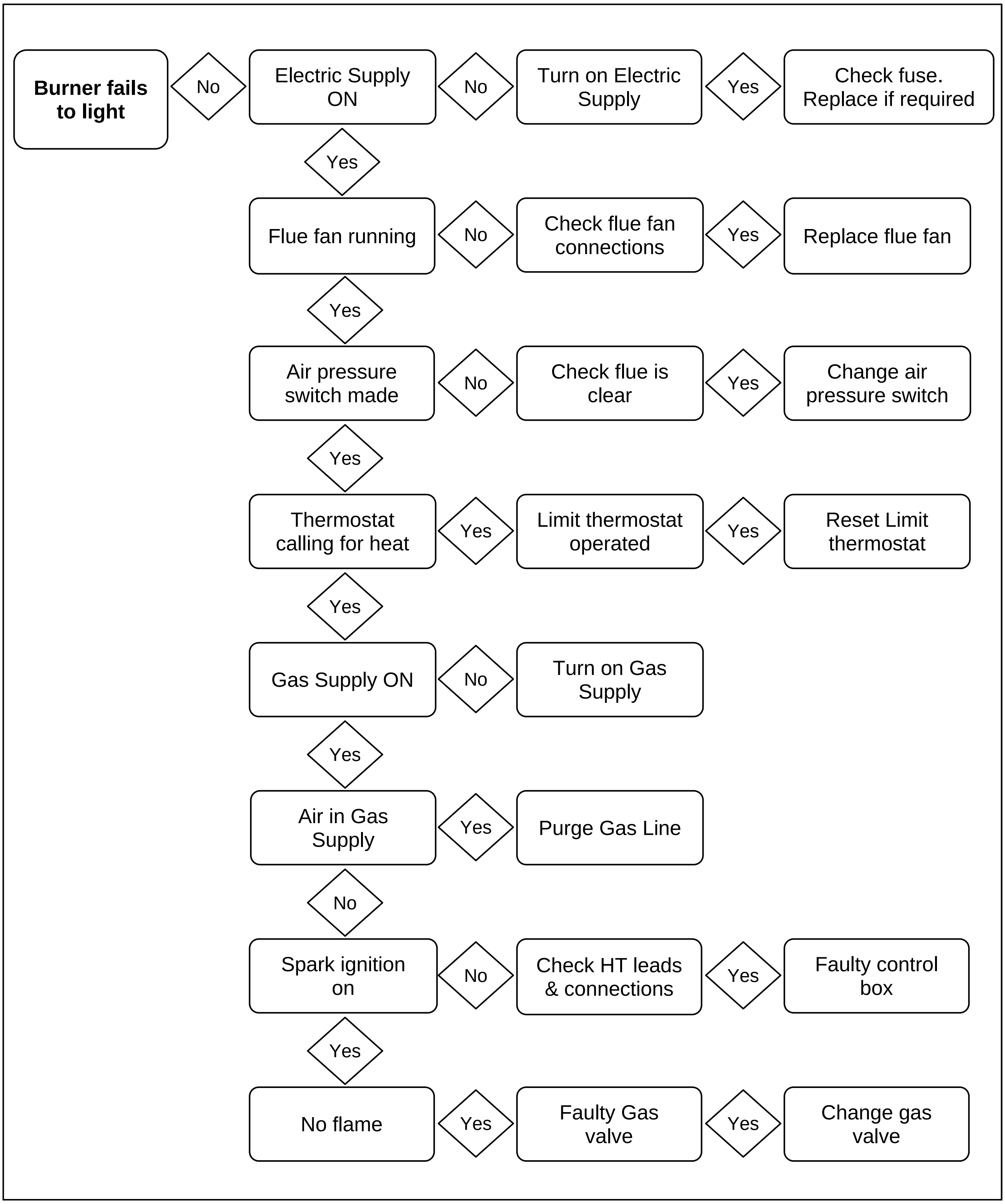
Flame supervision is via a flame sensor rod.

Check the flame sensor rod for signs of pitting or corrosion, ensure that the ceramic insulation material is not damaged or cracked. Check connections are secure.

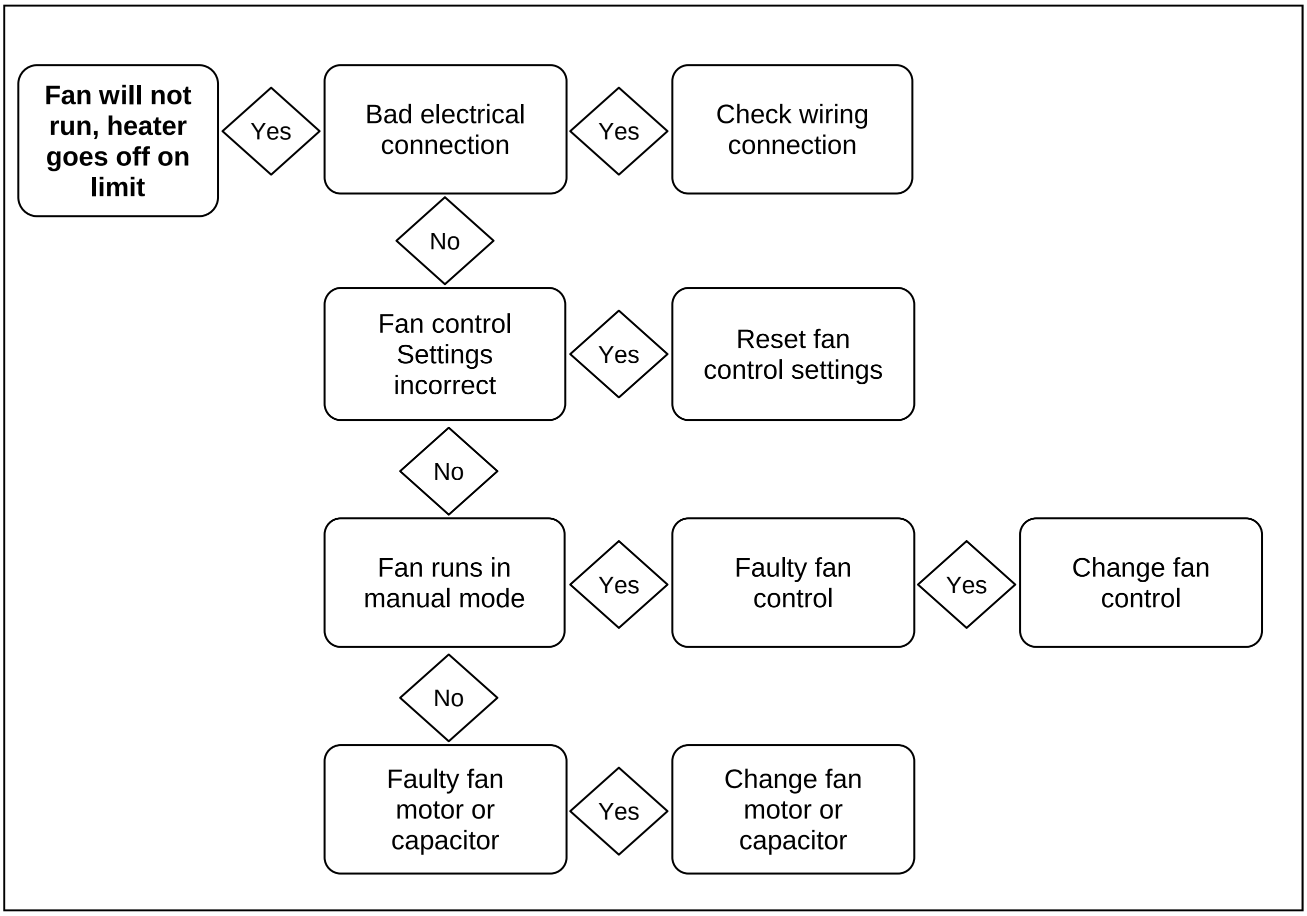
Main Governor
To adjust the main governor, using a screwdriver remove the metal cover to reveal the adjustment screw, and turn as follows :

Clockwise to increase pressure.
Anticlockwise to decrease pressure.

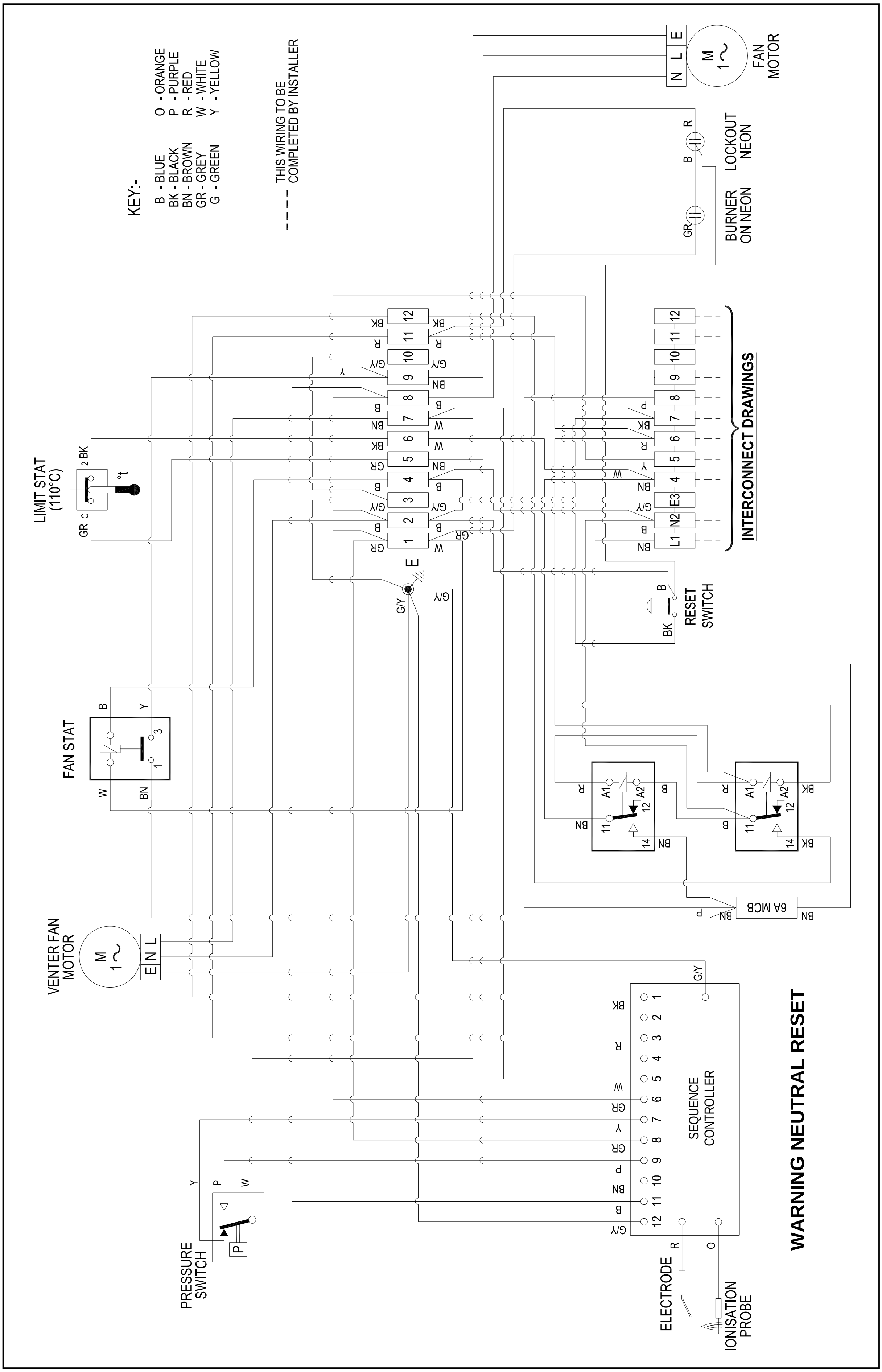
5.0 Fault finding



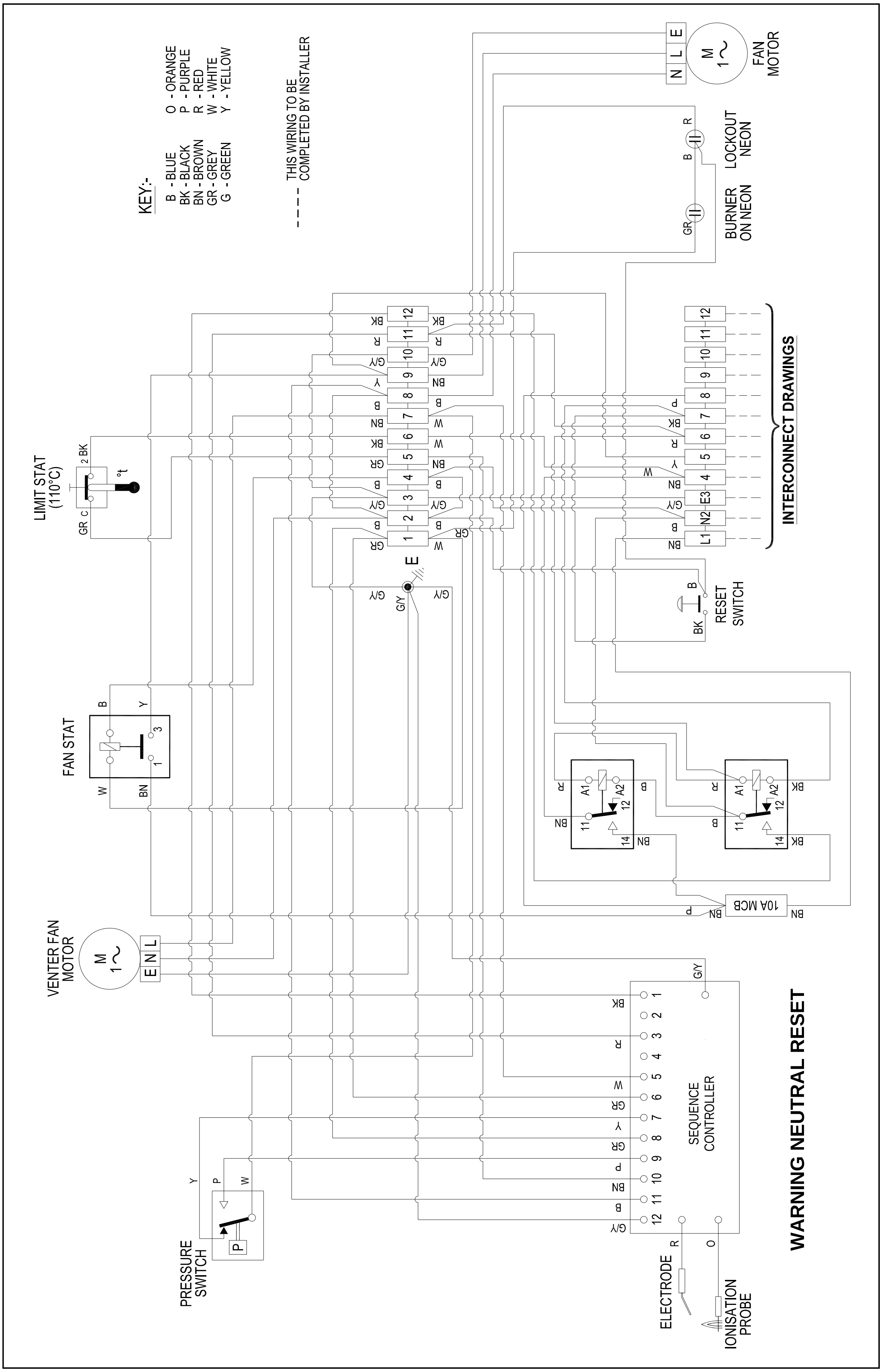
Fault finding cont'd



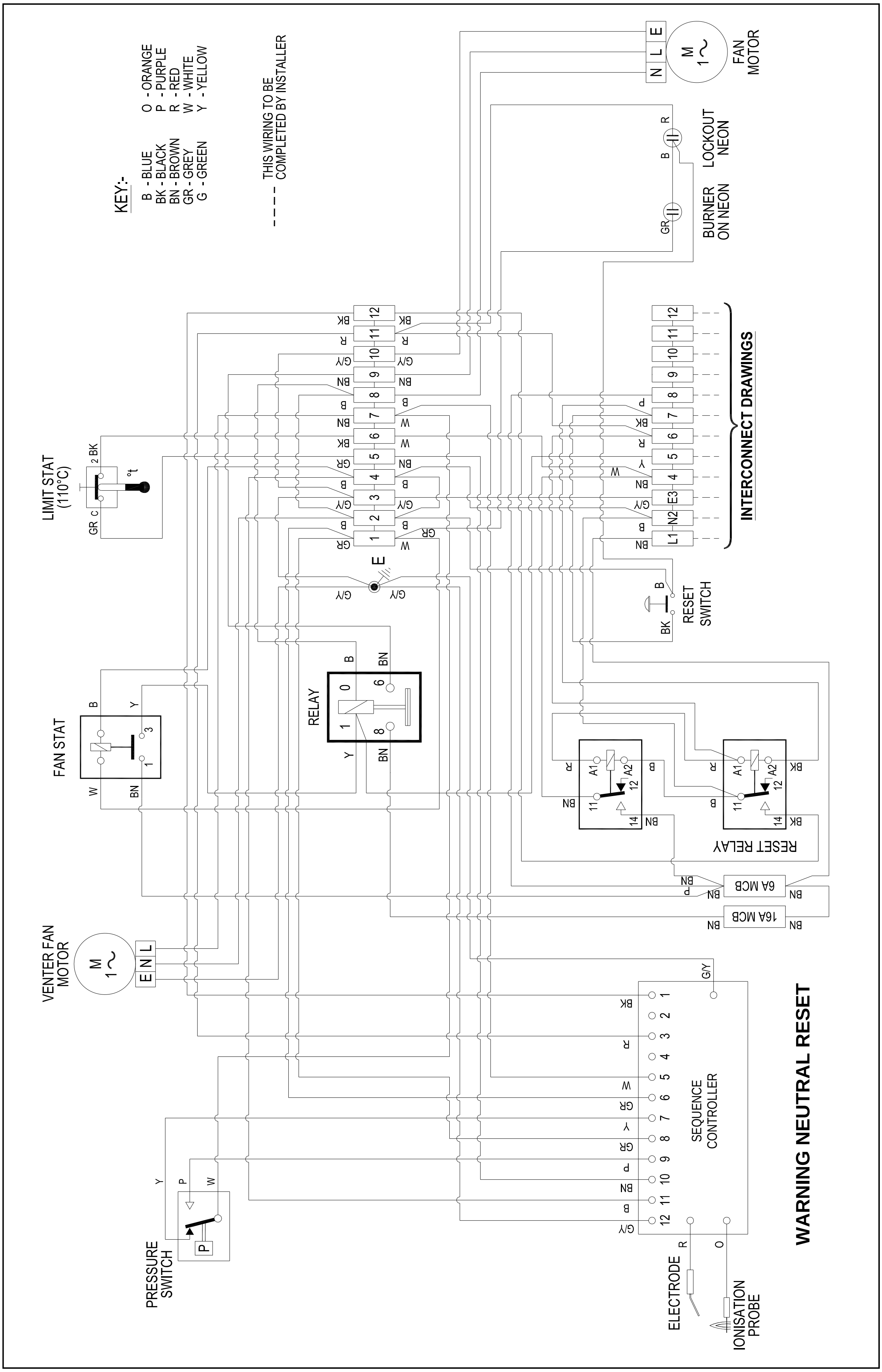
6. Wiring Diagram 33-68-001 VRA 12-60 VRC 12-30 Auto ignition On/Off



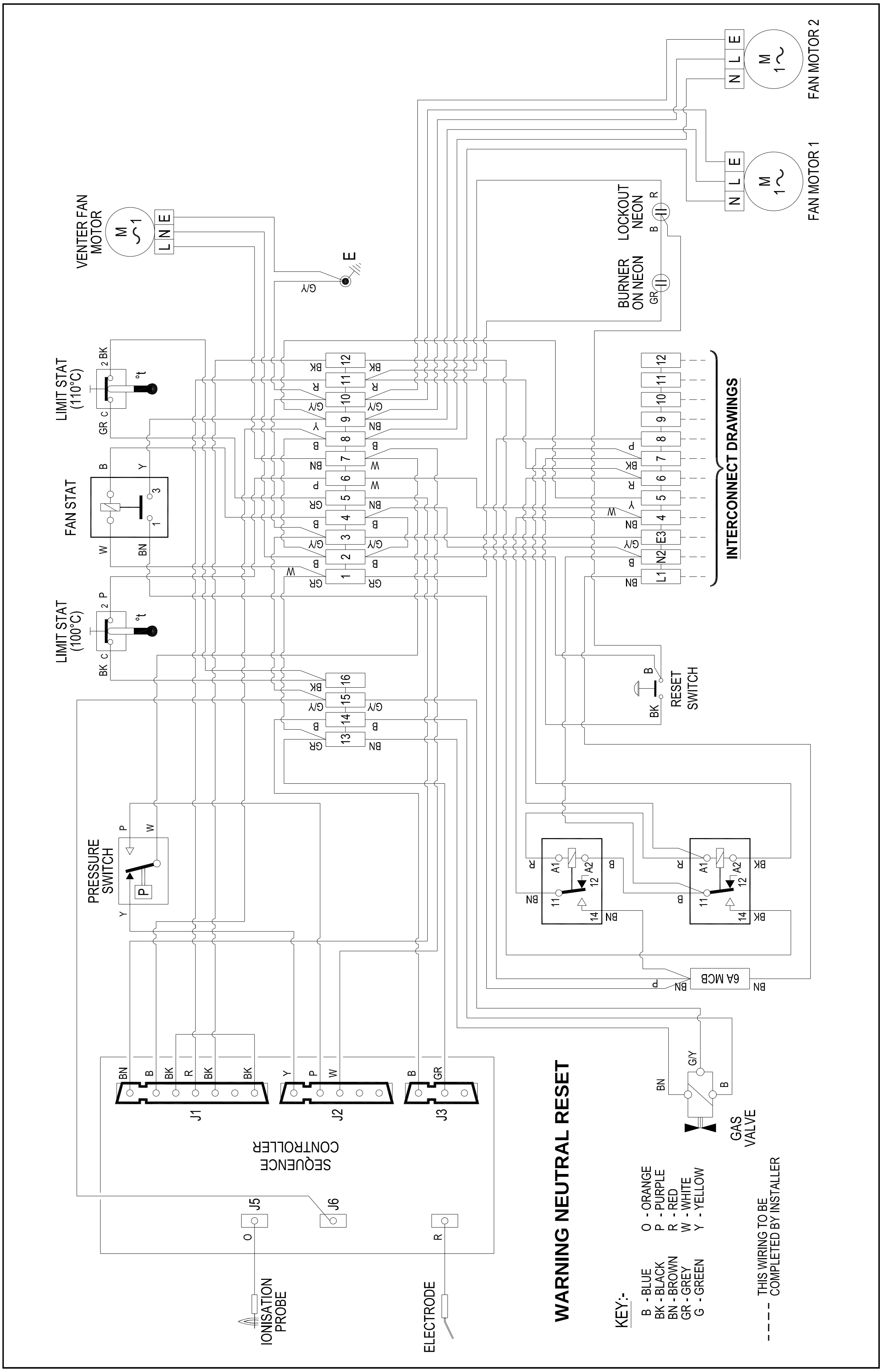
Wiring Diagram 33-68-007 VRC 42 Auto ignition On/Off



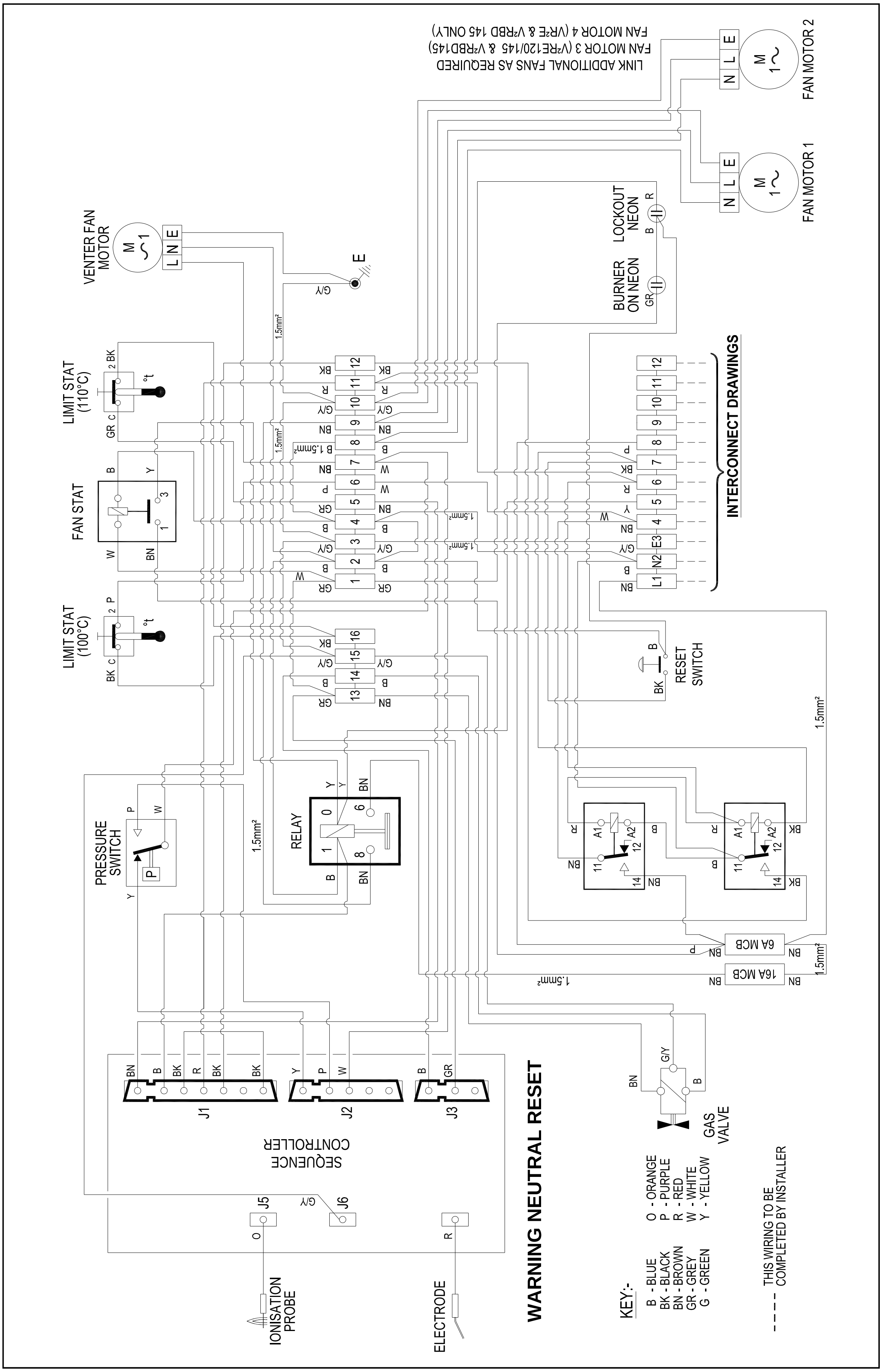
Wiring Diagram 33-68-010 VRC 50-60 Auto ignition On/Off



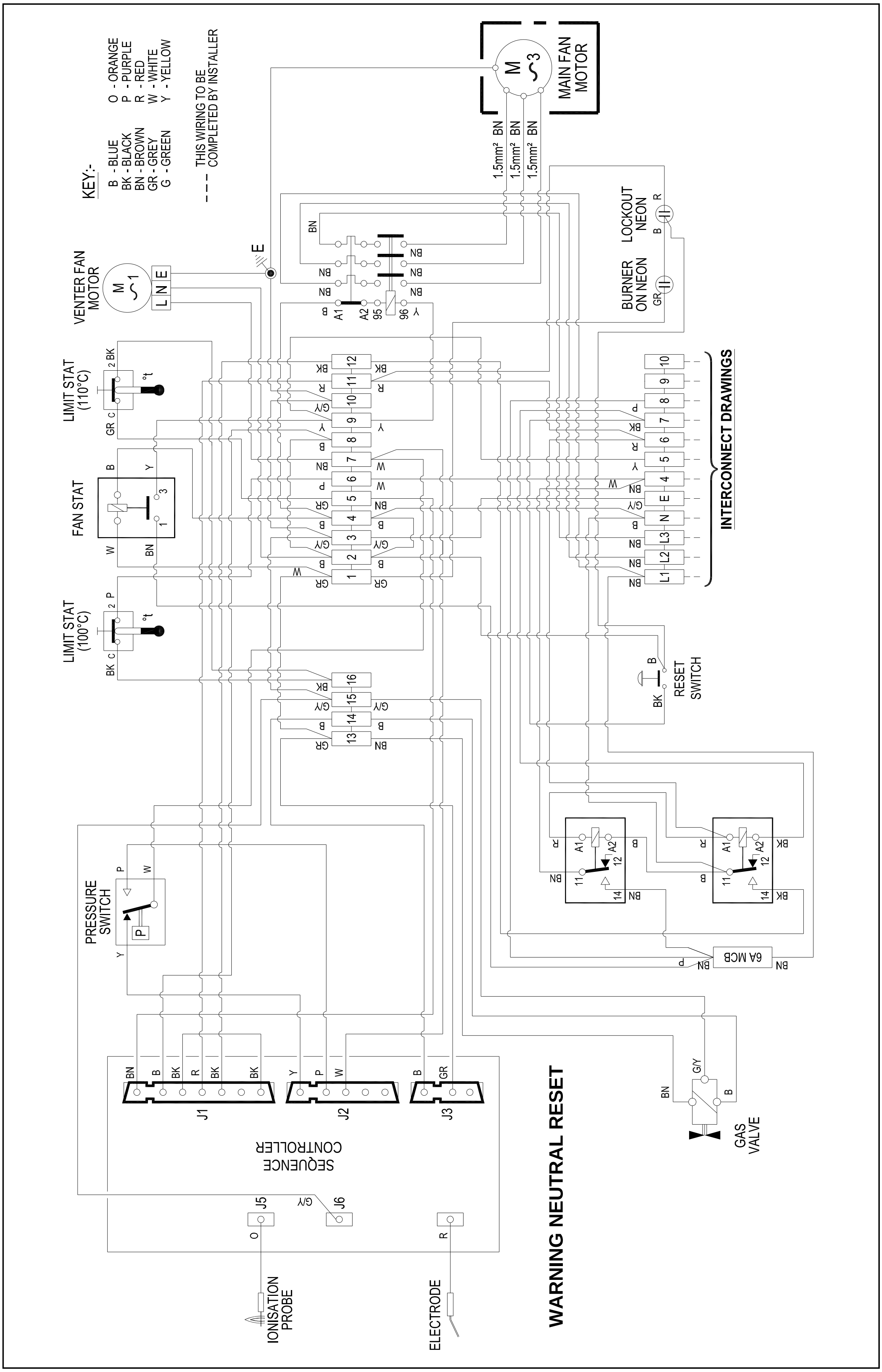
Wiring Diagram 33-68-004 VRA 72-145 Auto ignition On/Off



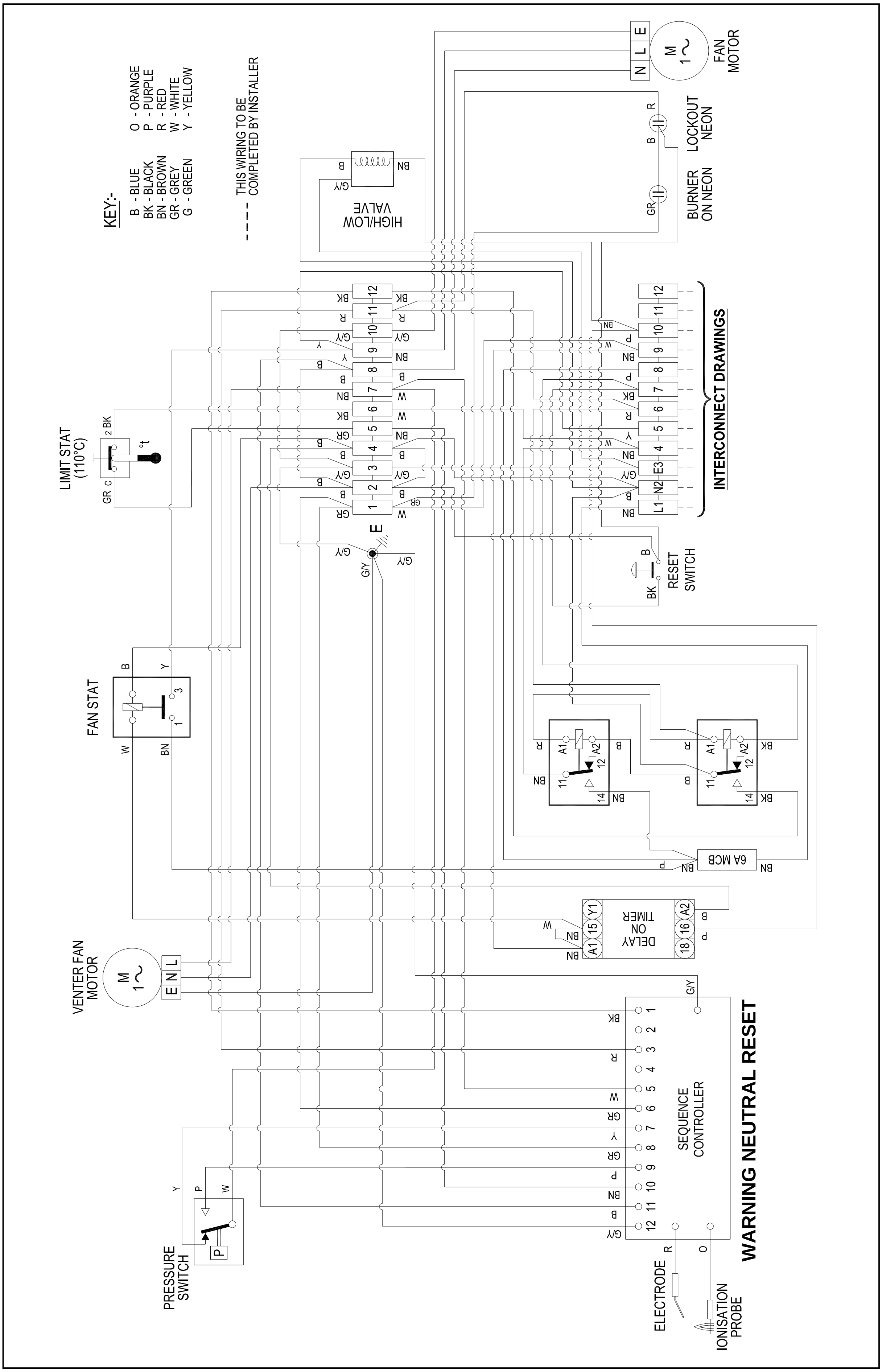
Wiring Diagram 33-68-013 VRC 72-95 VRE120-145 Auto ignition On/Off



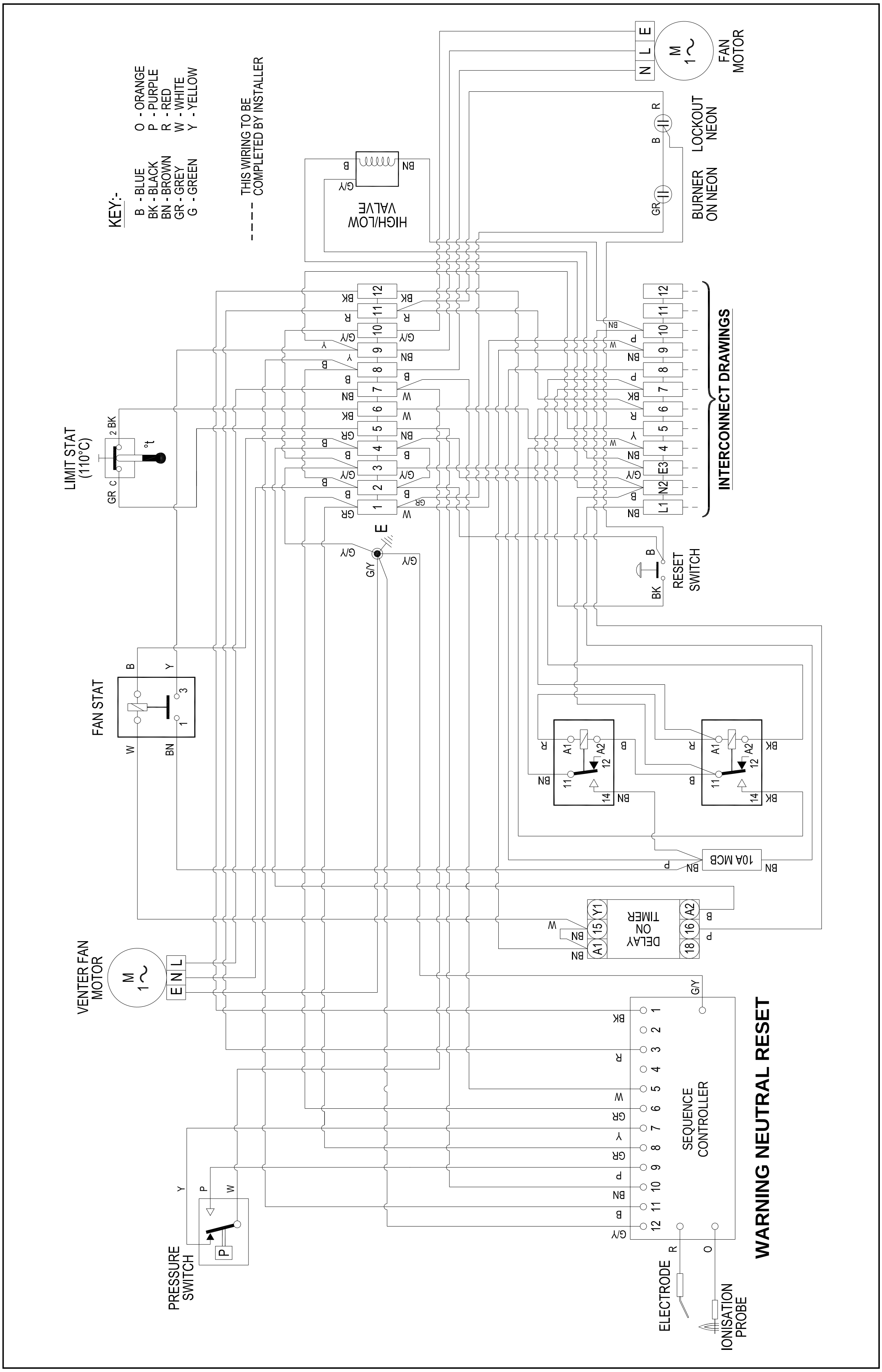
Wiring Diagram 33-68-016 VRC 72-145 3 Phase Auto ignition On/Off



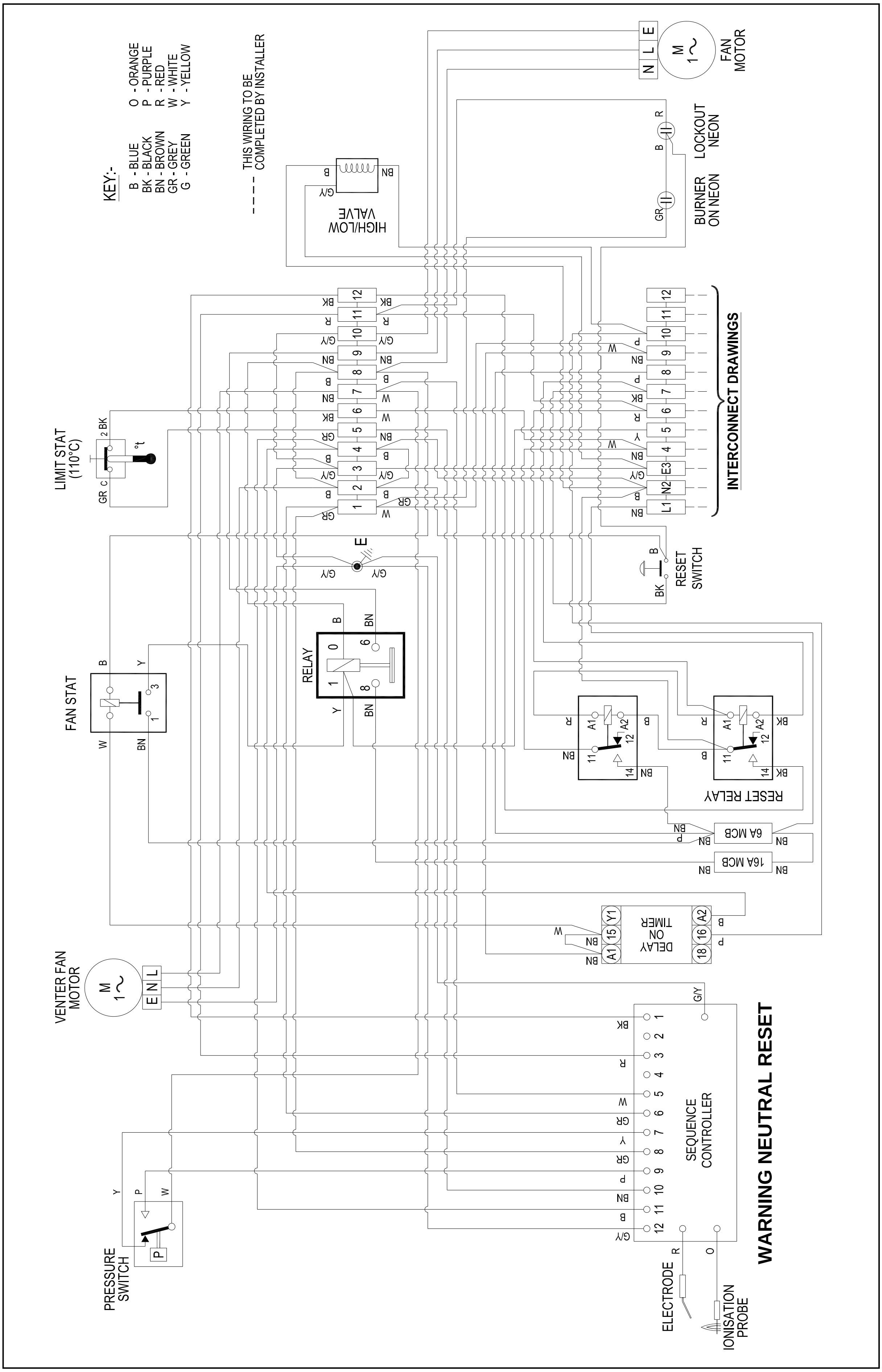
Wiring Diagram 33-68-002 VRA 12-60 VRC 12-30 Auto ignition Hi/Low



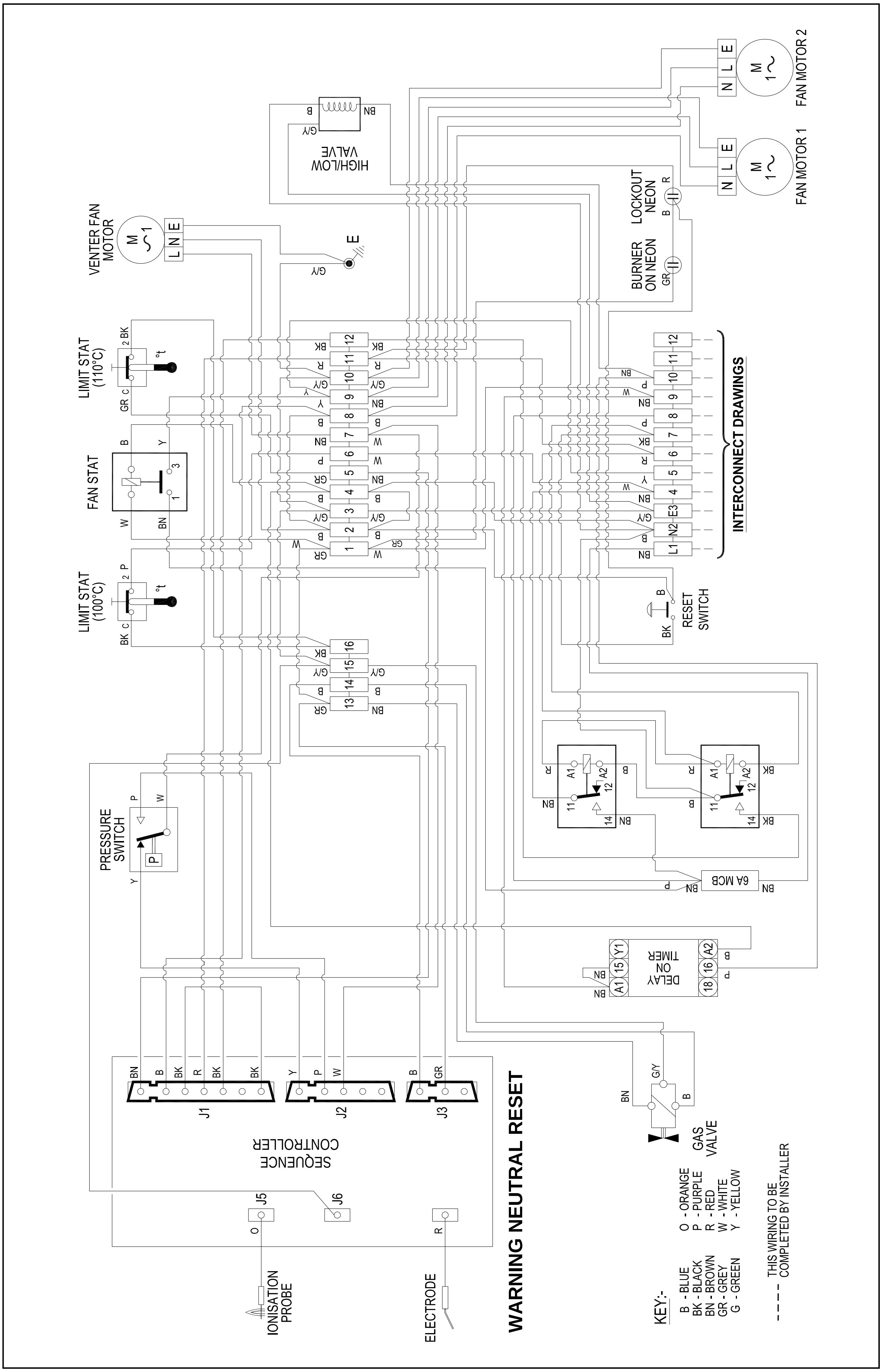
Wiring Diagram 33-68-008 VRC 42 Auto ignition Hi/Low



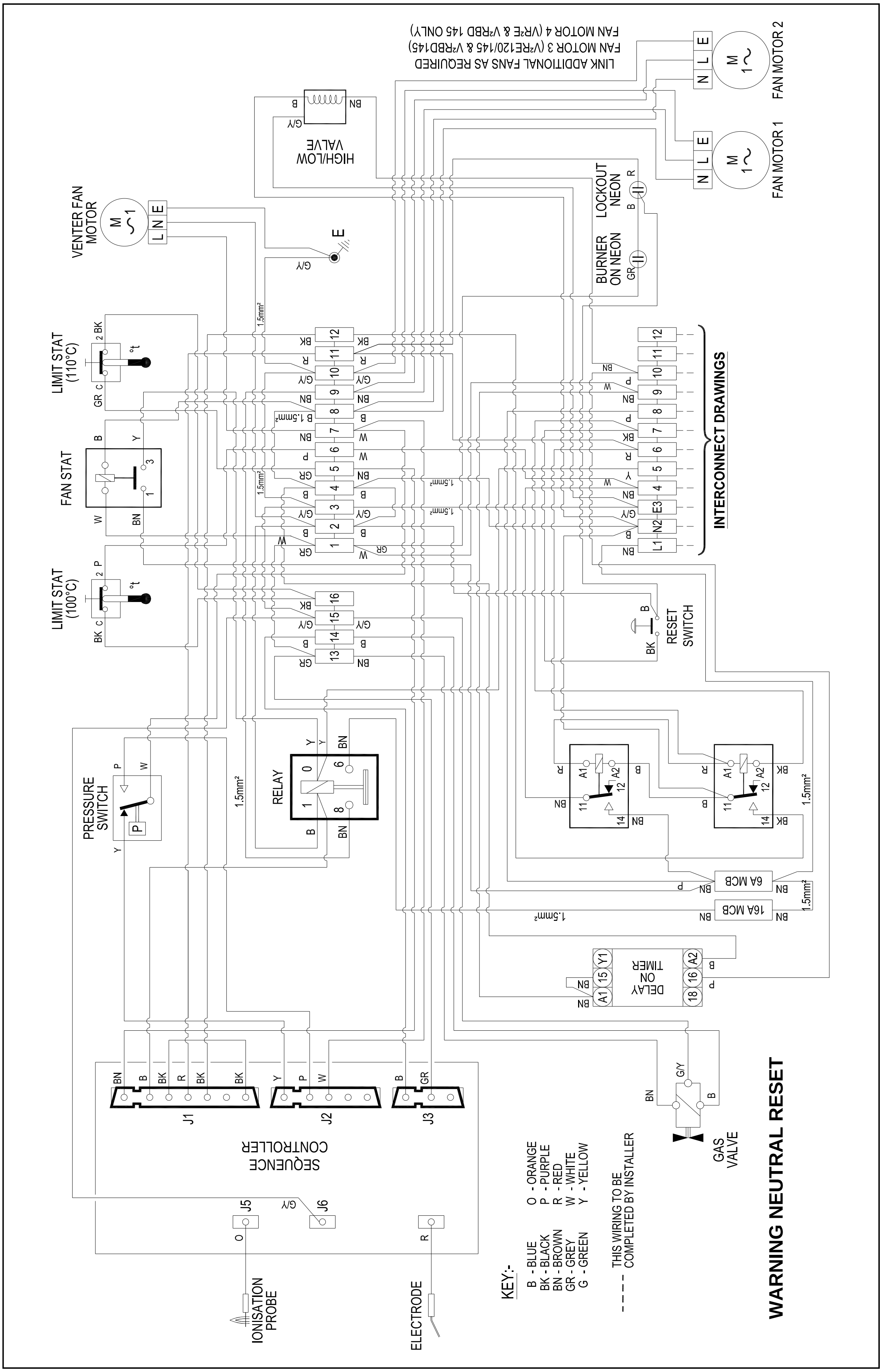
Wiring Diagram 33-68-011 VRC 50-60 Auto ignition Hi/Low



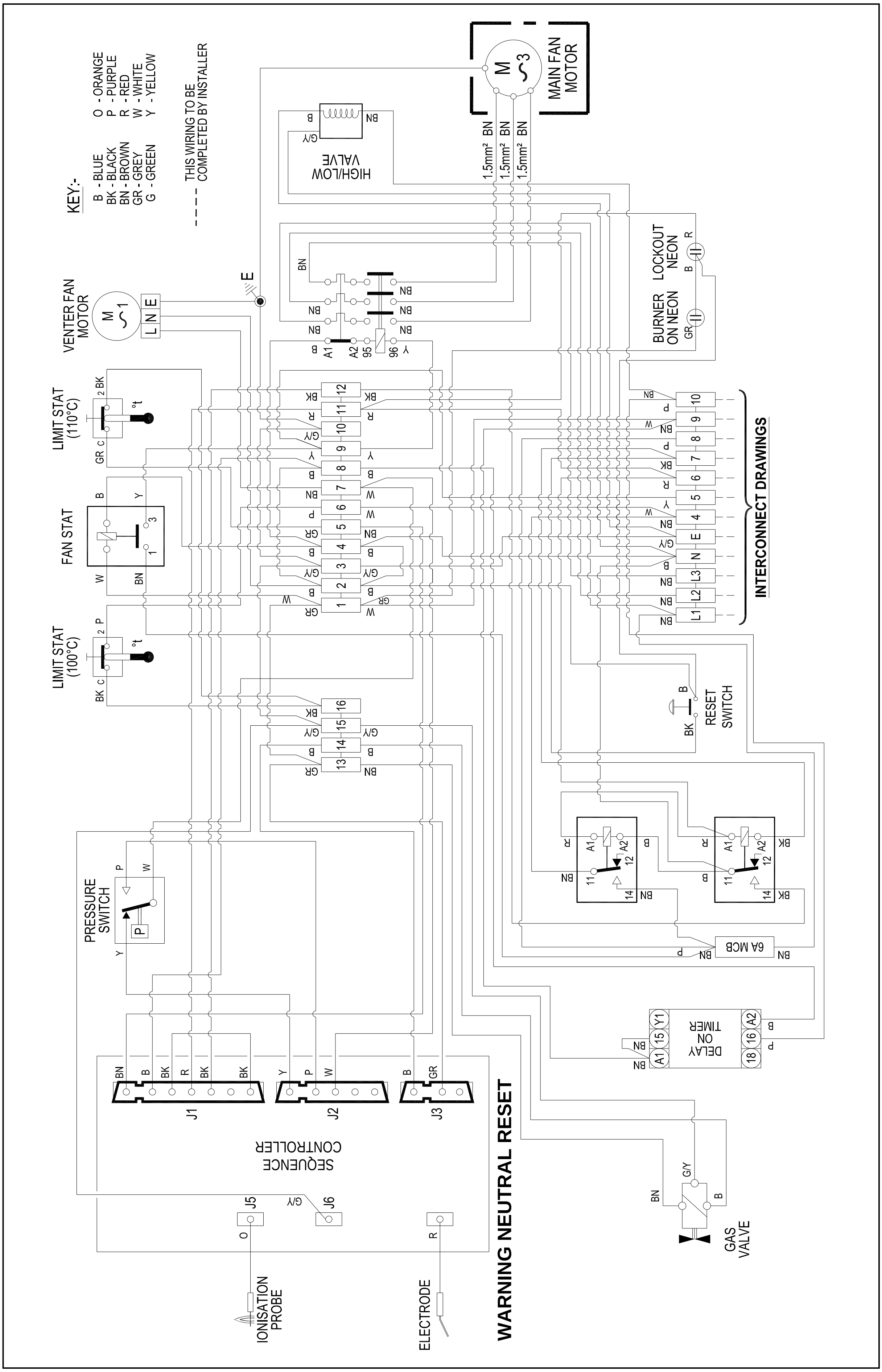
Wiring Diagram 33-68-005 VRA 72-145 Auto ignition Hi/Low



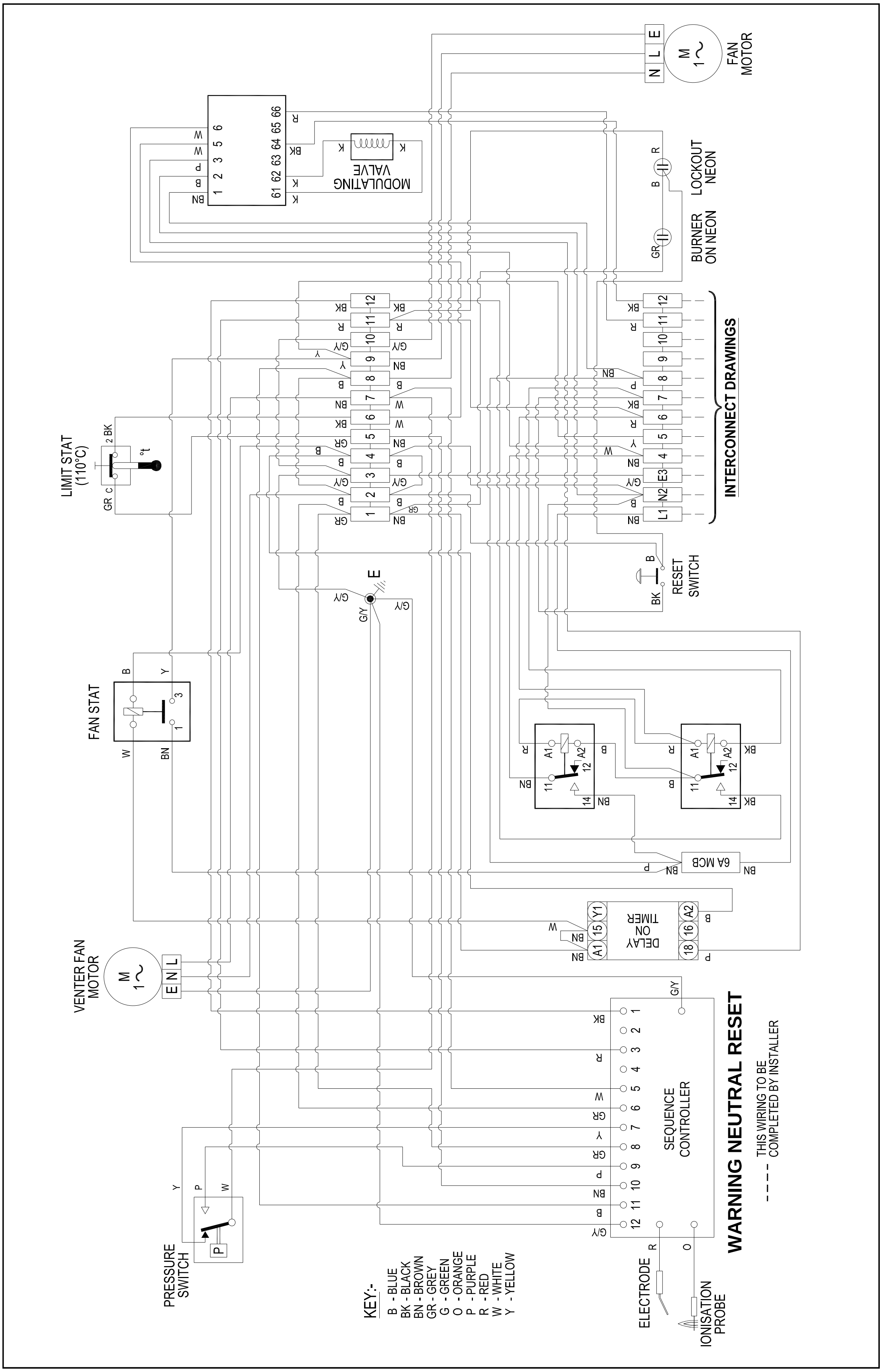
Wiring Diagram 33-68-014 VRC 72-95 VRE 120-145 Auto ignition Hi/Low



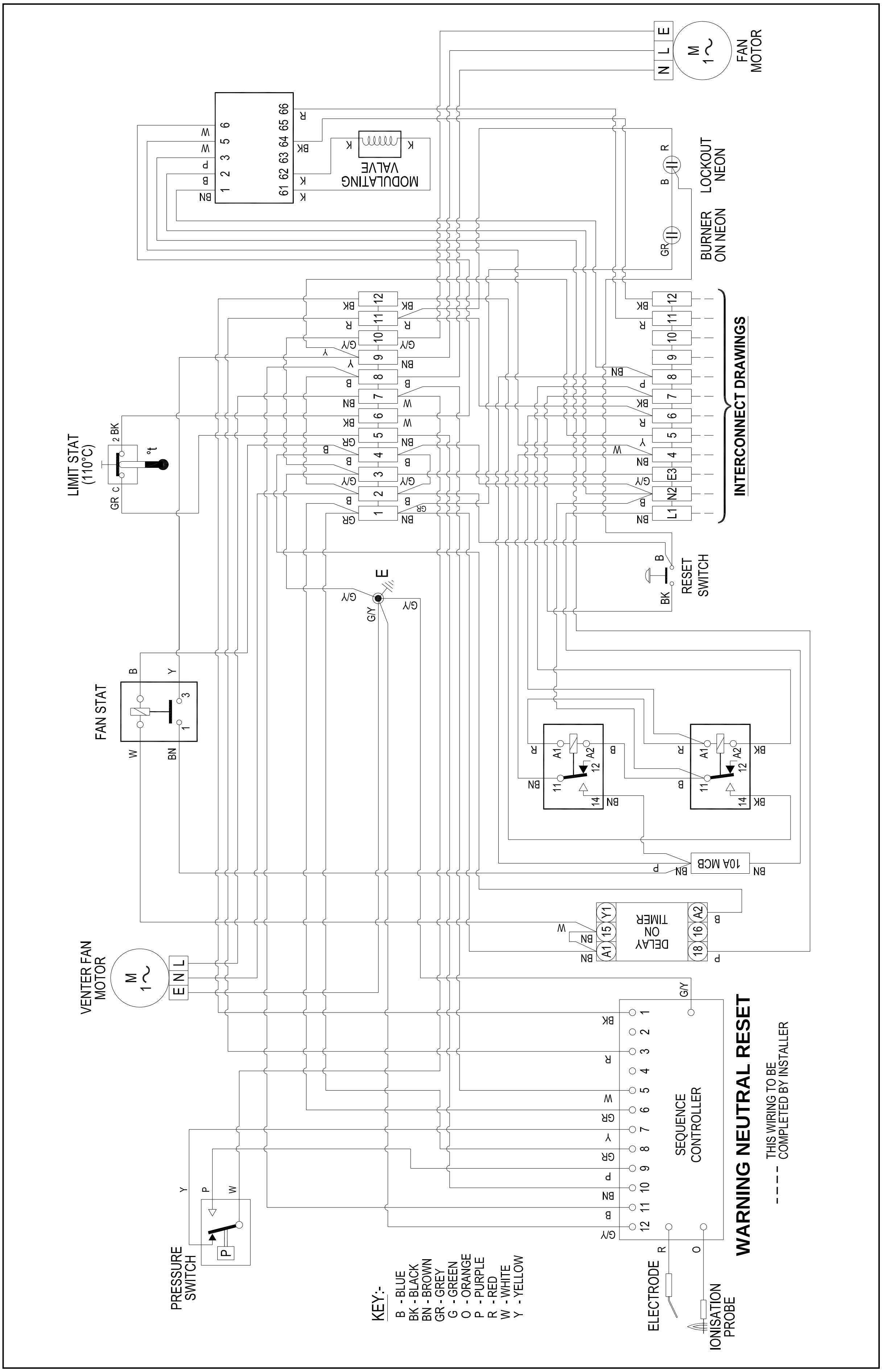
Wiring Diagram 33-68-017 VRC 72-145 3 Phase Auto ignition Hi/Low



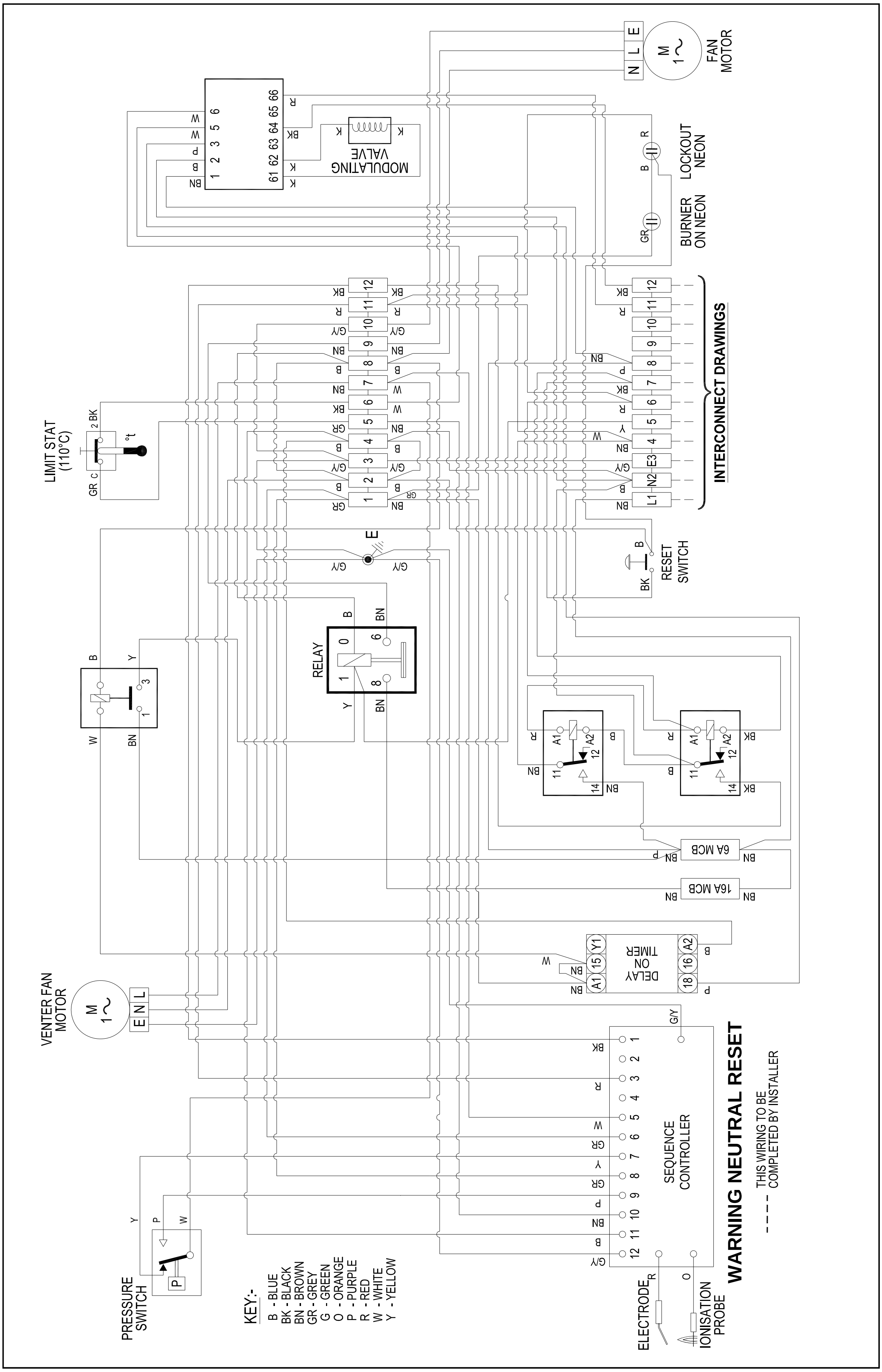
Wiring Diagram 33-68-003 VRA 12-60 VRC 12-30 Auto Ignition Modulation



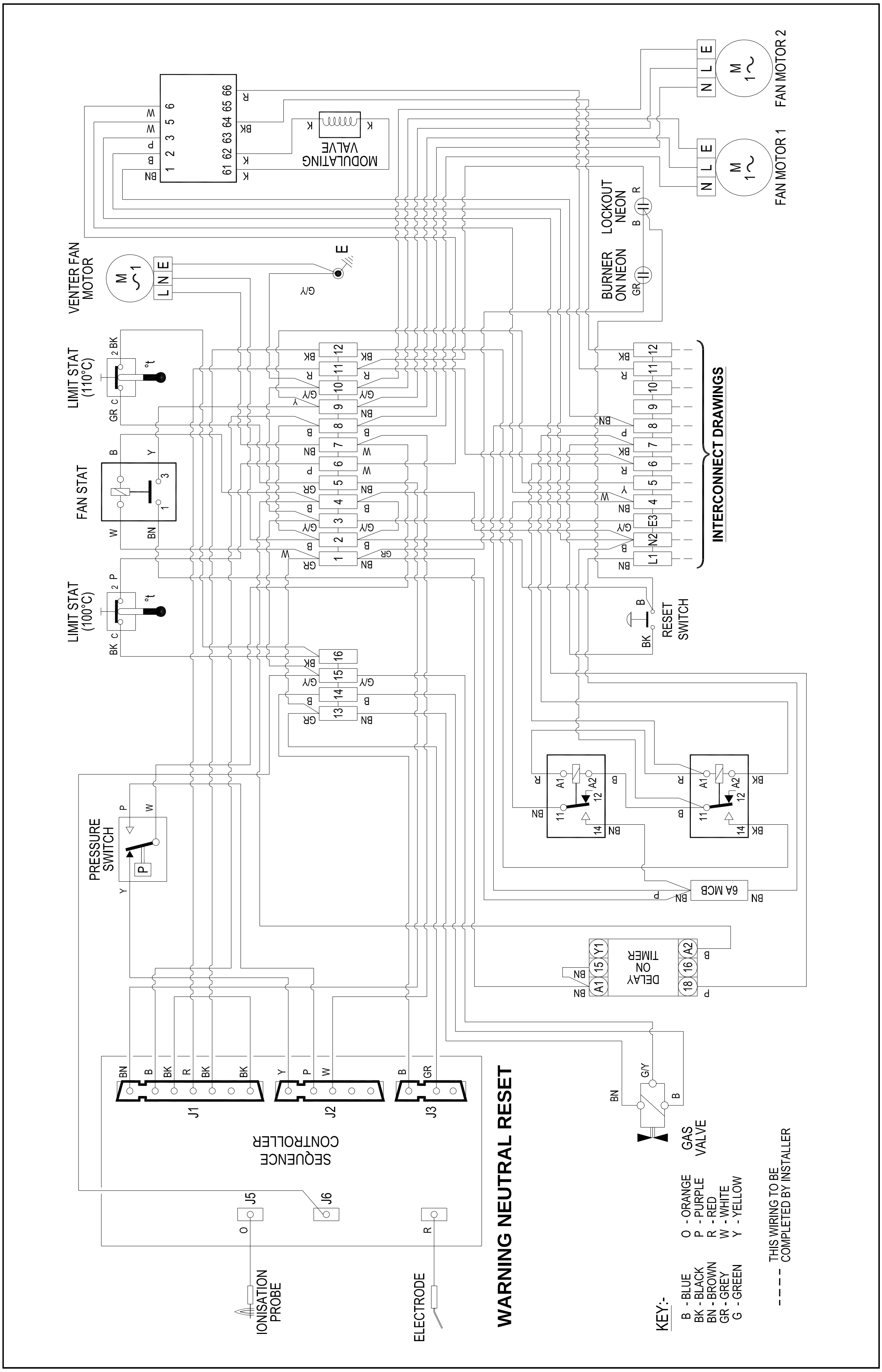
Wiring Diagram 33-68-009 VRC 42 Auto Ignition Modulation



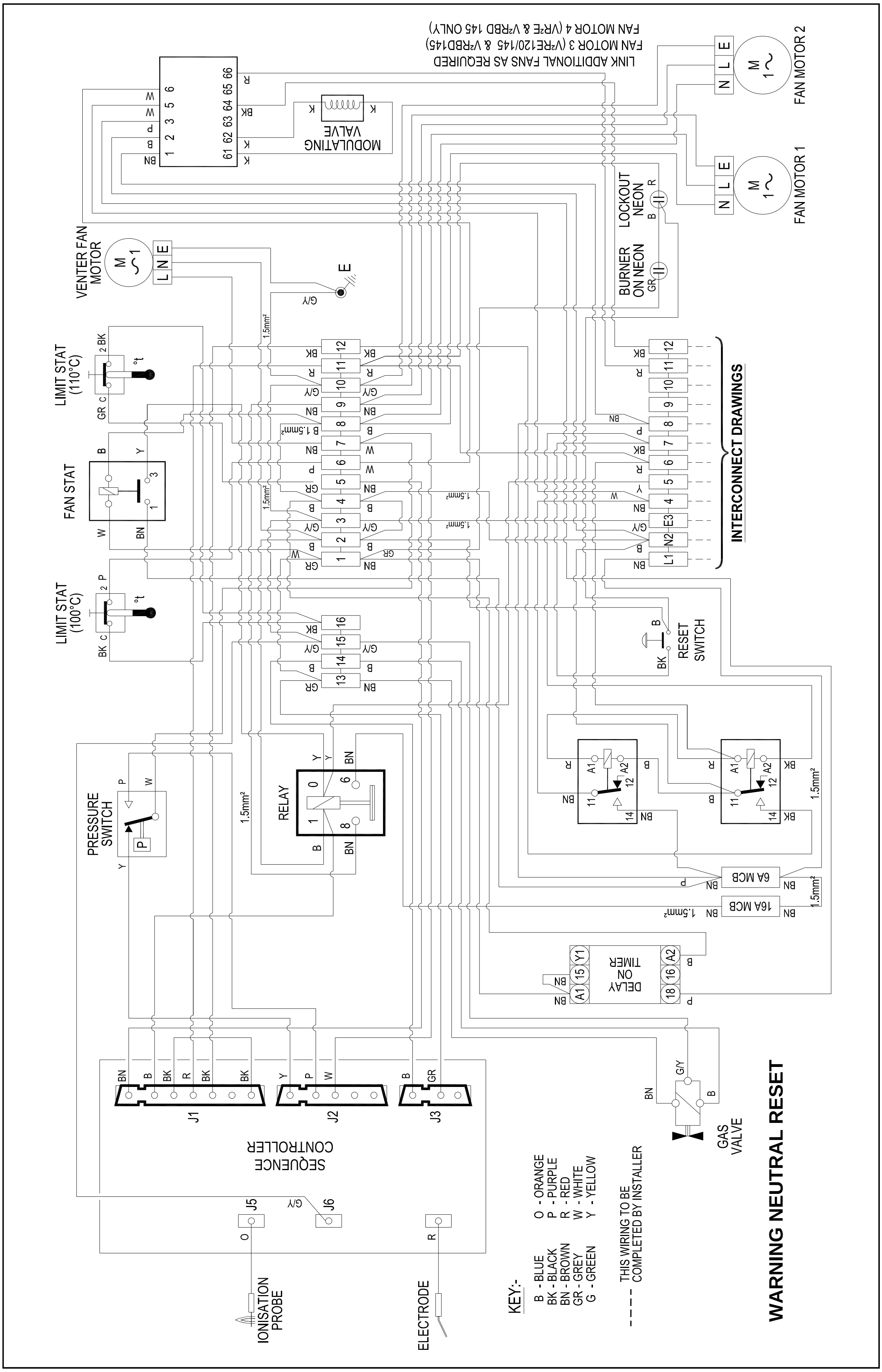
Wiring Diagram 33-68-012 VRC 50-60 Auto Ignition Modulation



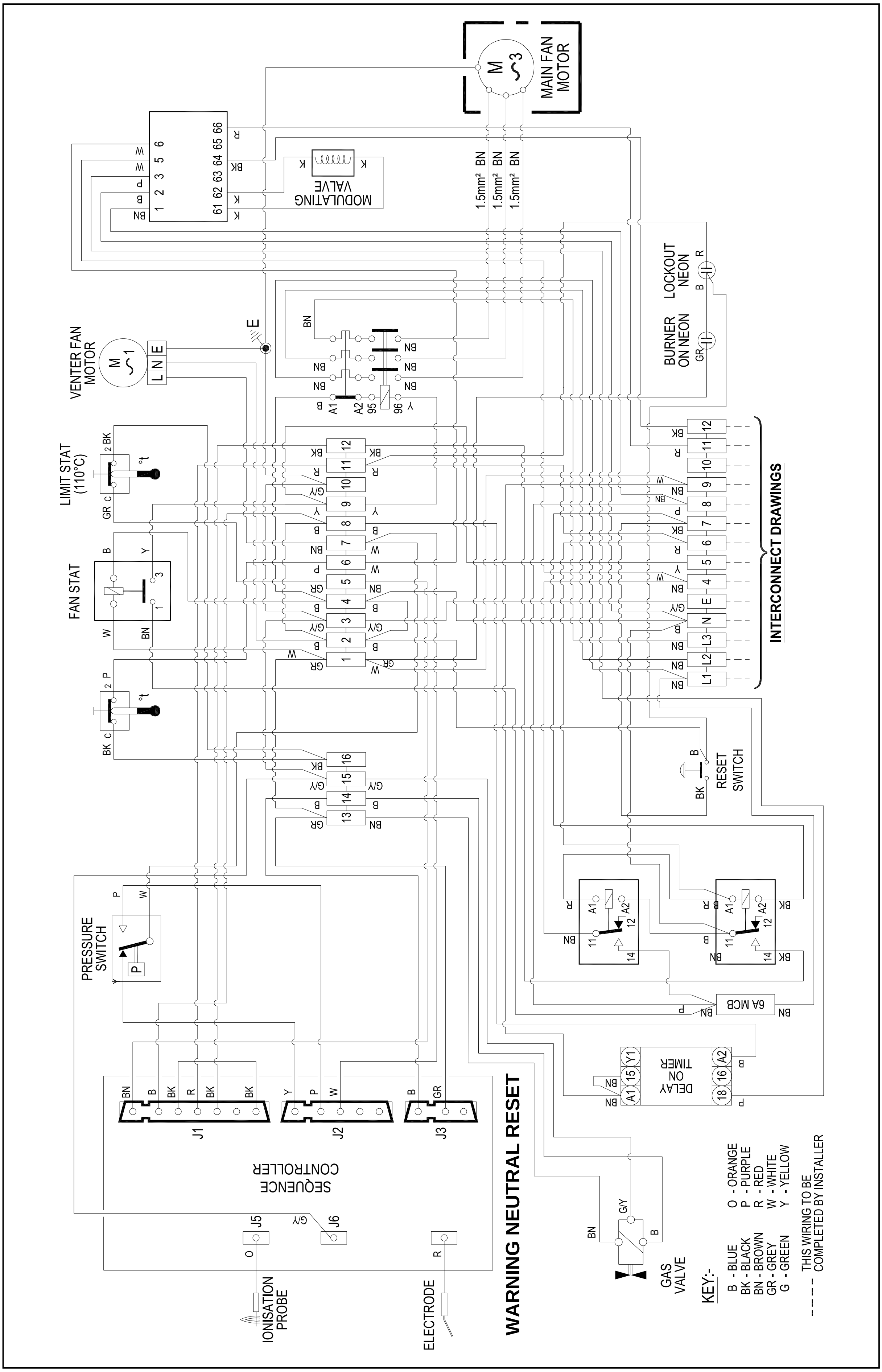
Wiring Diagram 33-68-006 VRA 72–145 Auto Ignition Modulation



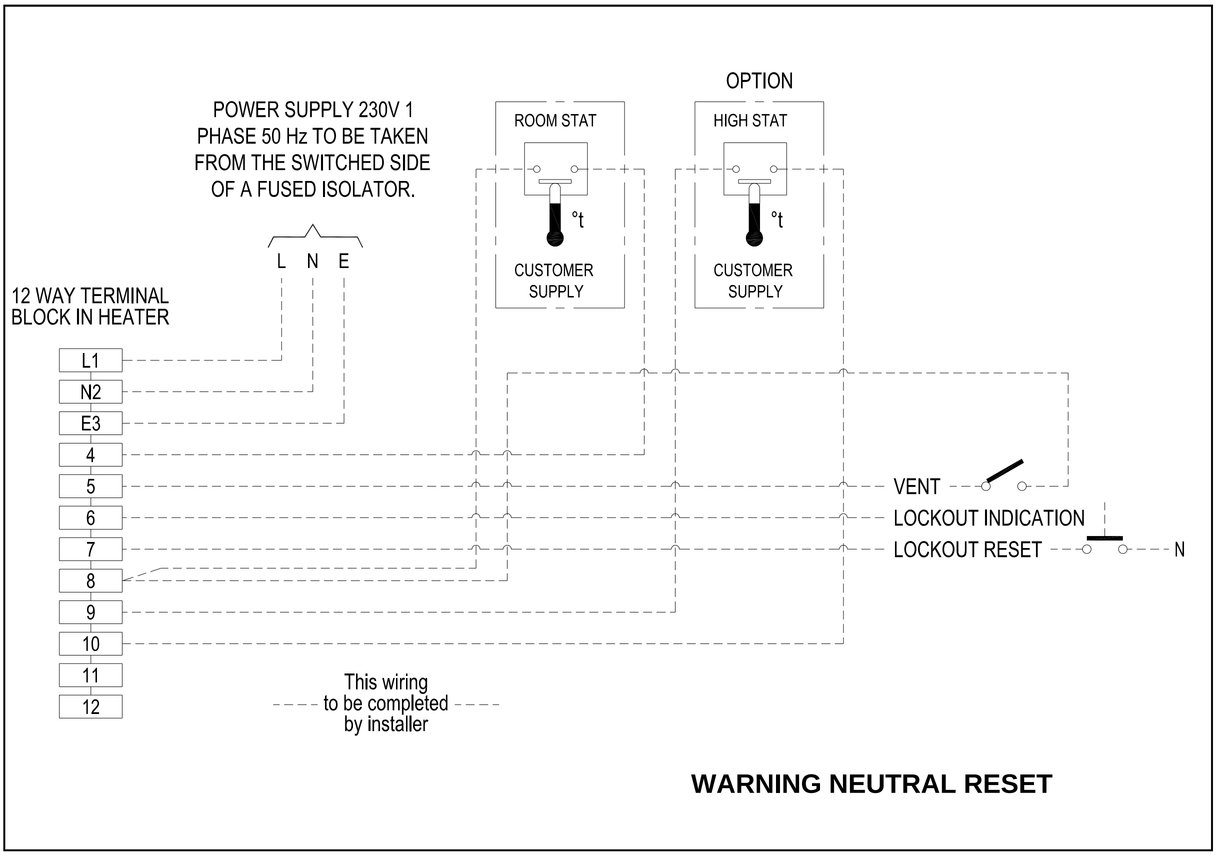
Wiring Diagram 33-68-015 VRC 72-95 VRE 120-145 Auto ignition Modulation



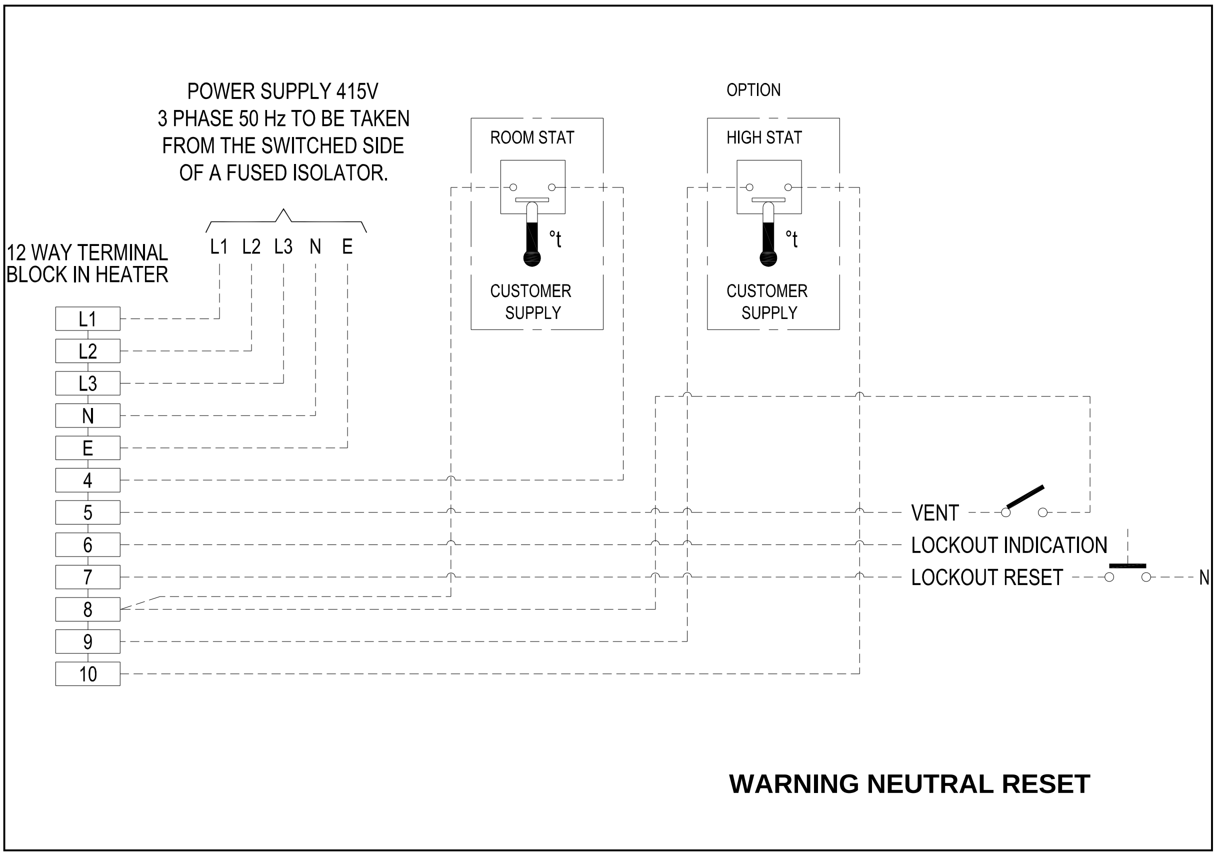
Wiring Diagram 33-68-018 VRC 72-145 3 Phase Auto ignition Modulation



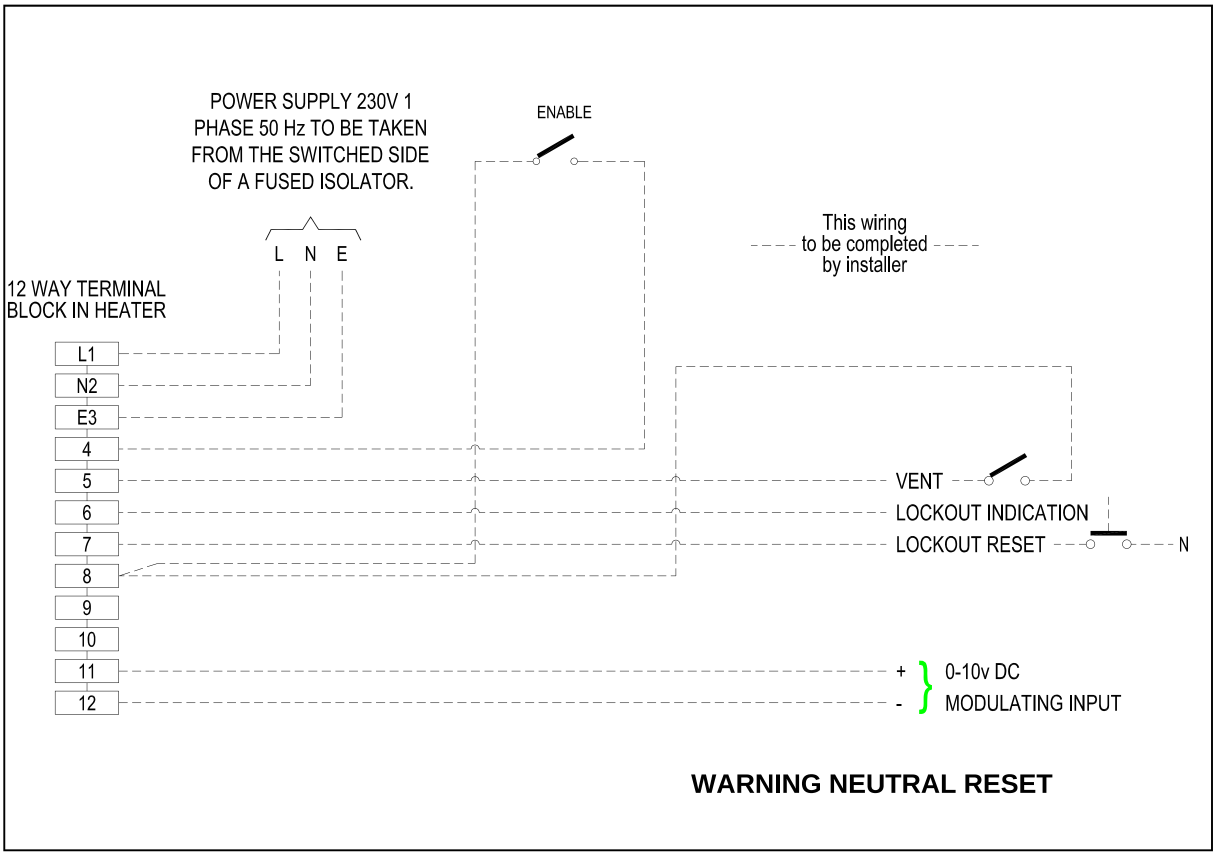
Less Controls Connections On/Off (Hi/Low) 1 Phase 33-64-349T



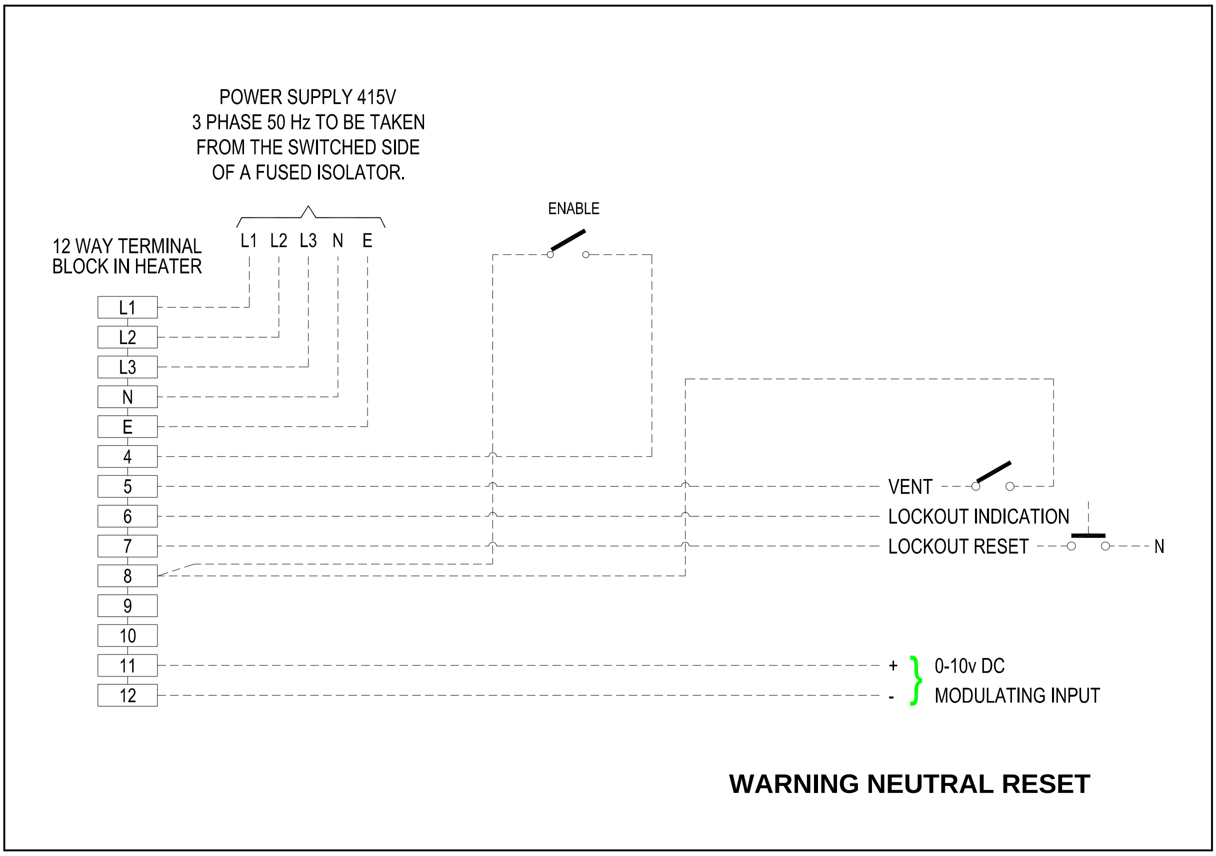
Less Controls Connections On/Off (Hi/Low) 3 Phase 33-67-014T



Less Controls Connections Modulation 1 Phase 33-64-584



Less Controls Connections Modulation 3 Phase 33-67-587



7.0 Technical Data

Appliance Type	B_{22} C_{32} C_{12}
Electrical Protection	IP20

7.1 Technical Data Common Information

Country	**Approved Gas Category**
AT,BG,CH,CY,CZ,DK,EE,ES,FI,GB,GR,HR, IE,IT,IS,LT,LV,NO,PT,RO,SE,SI,SK,TR	I_{2H}
BE,CZ,NL,FR,DE,IE,IT,ES,CH,PT,GB,SE, SK,SL,PT,PL,TR	I_{3P}
PL,LU,DE,RO	I_{2E}
PL	I_{2LS}
PL	I_{2LW}

7.2 Technical Data - models 12-50

NAT GAS / LPG	MODEL	12	20	30	42	50
HEAT OUTPUT	kW Btu	12.0 40.950	19.6 67,000	29.4 100,000	39.2 134,000	49.0 167,000
HEAT INPUT (Nett)	kW Btu	12.9 44,000	21.1 72,000	32.0 109,180	42.6 145,350	53.3 181,700
EFFICIENCY	% Nett	92.8	92.7	92.0	92.1	92.0
EFFICIENCY	%Gross	83.6	83.5	82.8	82.9	82.8
HEAT OUTPUT Low Fire	kW Btu	5.8 19,700	9.4 32,100	14.2 48,400	18.9 64,400	23.6 80,800
HEAT INPUT (Nett) Low Fire	kW Btu	6.5 22,200	10.6 36,200	16.0 54,600	21.3 72,700	26.7 91,200
GAS CONNECTION	BSP/Rc	1/2”	1/2”	1/2”	1/2”	1/2”
MIN INLET PRESS NAT GAS	mbar Ins WG	17.5 7	17.5 7	17.5 7	17.5 7	17.5 7
BURNER PRESSURE NAT GAS	mbar Ins WG	12.6 5	8.3 3.3	8.3 3.3	8.3 3.3	8.3 3.3
BURNER PRESSURE NAT GAS Hi/Low/Modulation	Hi mbar Lo mbar	12.6 3.4	8.3 2.1	8.3 2.3	8.3 2.3	8.3 2.1
MAIN INJECTOR NATURAL GAS	mm No Off	1.8 3	2.2 4	2.2 6	2.2 8	2.2 10
NAT GAS CONSUMPTION	ft^3/hr m^3/hr	48 1.37	79 2.23	119 3.38	159 4.50	199 5.63
MIN INLET PRESS LPG	mbar Ins WG	37.0 14.8	37.0 14.8	37.0 14.8	37.0 14.8	37.0 14.8
BURNER PRESSURE LPG	mbar Ins WG	21.3 8.52	29.2 11.68	29.2 11.68	29.2 11.68	29.2 11.68
LPG PROPANE CONSUMPTION	m^3/hr Kg/h	0.52 0.96	0.86 1.59	1.30 2.41	1.73 3.20	2.16 4.00
MAIN INJECTOR PROPANE	mm No Off	1.2 3	1.3 4	1.3 6	1.3 8	1.3 10
TEMPERATURE RISE	ºC ºF	32 58	30 54	31 56	34 61	33 59
AIR FLOW	ft^3/min m^3/sec	657 0.31	1165 0.55	1674 0.79	2034 0.96	2564 1.21
VRA THROW	ft mtrs	26 8	49 15	59 18	65 20	75 23
CENTRIFUGAL FAN STATIC PRESSURE	Pa Ins WG	100 0.40	125 0.50	100 0.40	150 0.60	150 0.60
SOUND LEVEL @ 3m	Dba	53	55	57	58	61
FLUE DIAMETER	mm	80	80	100	100	100
COMBUSTION AIR DIA	mm	80	80	100	100	100
SUPPLY VOLTAGE	Axial Cent	230/1/50 230/1/50	230/1/50 230/1/50	230/1/50 230/1/50	230/1/50 230/1/50	230/1/50 230/1/50
ELECTRICAL POWER (AMPERES)	Axial Cent	0.4 2	0.7 2	0.8 2	1.2 5	1.6 8
INTERNAL MCB RATING AMPERES	Axial Cent	6 6	6 6	6 6	6 10	6 10
POWER ABSORPTION Kw	Axial Cent	0.11 0.3	0.17 0.4	0.21 0.4	0.28 0.7	0.35 1.1
MOUNTING HEIGHT (MTRS)	Min Max	1.8 2.3	1.8 2.3	2.0 2.5	2.0 2.5	2.4 3.0
GROSS FLUE TEMP	ºC	130	135	145	140	150
WEIGHT Kgs	Axial Cent	71 82	76 87	90 108	104 126	120 126
FLUE RESISTANCE	min mbar max mbar	-0.05 +0.1	-0.1 +0.2	-0.1 +0.2	-0.1 +0.2	-0.1 +0.2

Technical Data - models 60-145

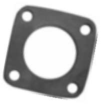
NAT GAS / LPG	MODEL	60	72	95	120	145
HEAT OUTPUT	kW Btu	58.8 201,000	72.0 246,000	96.0 328.000	120.0 409,000	144.0 491,000
HEAT INPUT (Nett)	kW Btu	63.9 218,000	78.8 268,900	105.2 359,000	130.4 445,000	156.5 534,000
EFFICIENCY	% Nett	92.0	91.4	91.2	91.5	91.5
EFFICIENCY	% Gross	82.8	82.3	82.1	82.4	82.4
HEAT OUTPUT Low Fire	kW Btu	28.3 96,700	34.9 119,100	46.6 158,900	57.7 197,000	69.3 236,500
HEAT INPUT (Nett) Low Fire	kW Btu	32.0 109,200	39.4 134,500	52.6 179,500	65.2 222,500	78.3 267,200
GAS CONNECTION	BSP/Rc	1/2”	3/4”	3/4”	3/4”	3/4”
MIN INLET PRESS NAT GAS	mbar Ins WG	17.5 7	17.5 7	17.5 7	17.5 7	17.5 7
BURNER PRESSURE NAT GAS	mbar Ins WG	8.6 3.4	8.7 3.5	8.7 3.5	9.2 3.8	9.2 3.8
BURNER PRESSURE NAT GAS Hi/Low/Modulation	Hi mbar Lo mbar	8.6 2.3	8.7 2.3	8.7 2.3	9.2 2.3	9.2 2.3
MAIN INJECTOR NATURAL GAS	mm No Off	2.2 12	3.4 6	3.4 8	3.4 10	3.4 12
NAT GAS CONSUMPTION	ft^3/hr m^3/hr	239 6.76	294 8.33	393 11.12	490 13.87	587 16.63
MIN INLET PRESS LPG	Mbar Ins WG	37.0 14.8	37.0 14.8	37.0 14.8	37.0 14.8	37.0 14.8
BURNER PRESSURE LPG	Mbar Ins WG	29.2 11.68	25.5 10.2	25.5 10.2	25.5 10.2	25.5 10.2
LPG PROPANE CONSUMPTION	m^3/hr Kg/h	2.59 4.79	3.21 5.94	4.28 7.92	5.34 9.88	6.41 11.86
MAIN INJECTOR PROPANE GAS	Mm No Off	1.3 12	2.0 6	2.0 8	2.0 10	2.0 12
TEMPERATURE RISE	ºC ºF	31 56	32 58	34 61	32 58	32 58
AIR FLOW	ft^3/min m^3/sec	3263 1.54	4026 1.90	4789 2.26	6527 3.08	8010 3.78
VRA THROW	ft mtrs	88 27	102 31	105 32	125 38	128 39
CENTRIFUGAL FAN STATIC PRESSURE	Pa Ins WG	180 0.72	150 0.60	180 0.72	200 0.80	200 0.80
SOUND LEVEL @ 3m	Dba	65	61	63	66	66
FLUE DIAMETER *	mm	100	130	130	130	130
COMBUSTION AIR DIA	mm	100	130	130	130	130
SUPPLY VOLTAGE	Axial Cent	230/1/50 230/1/50	230/1/50 230/1/50	230/1/50 230/1/50	230/1/50 415/3/50	230/1/50 415/3/50
ELECTRICAL POWER (AMPERES)	Axial Cent	2.7 8	2.8 9	4.2 12	4.8 6	5.8 6
INTERNAL MCB RATING AMPERES	VRA /VRE Cent	6 16	6 6/16	6/10 6/16	6/16 6/16	6/16 6/16
POWER ABSORPTION Kw	Axial Cent	0.65 1.1	0.56 1.4	0.88 2.2	0.95 3.1	1.2 3.1
MOUNTING HEIGHT (MTRS)	Min Max	2.4 3.0	2.4 3.5	2.4 3.5	2.4 3.5	2.4 3.5
GROSS FLUE TEMP	ºC	150	150	150	160	160
WEIGHT Kgs	Axial Cent	138 160	181 216	203 238	242 281	279 323
FLUE RESISTANCE	min mbar max mbar	-0.1 +0.2	-0.2 +0.4	-0.2 +0.4	-0.2 +0.4	-0.2 +0.4

8.0 Parts List

	Heater Size/ Description	12	20	30	42	50	60
	Gas Valve	28-30-180					
	Hi/Low Valve	28-30-187					
	Valve Gasket	28-64-226					
	Modulating Valve	28-30-201					
	Modulation Interface Board	28-30-198					
	Control Box	29-01-173					
	Pressure Switch	28-40-162			N/A		
	Pressure Switch	N/A			28-40-136	N/A	
	Pressure Switch	N/A				33-62-119	N/A
	Pressure Switch	N/A					28-40-161
	Limit Stat	28-16-058					
	Fan Control Thermostat	28-16-059					
	Injector Natural Gas	33-64-263	33-64-144				
	Injector Propane Gas	33-64-146	33-67-322				

Parts list cont'd

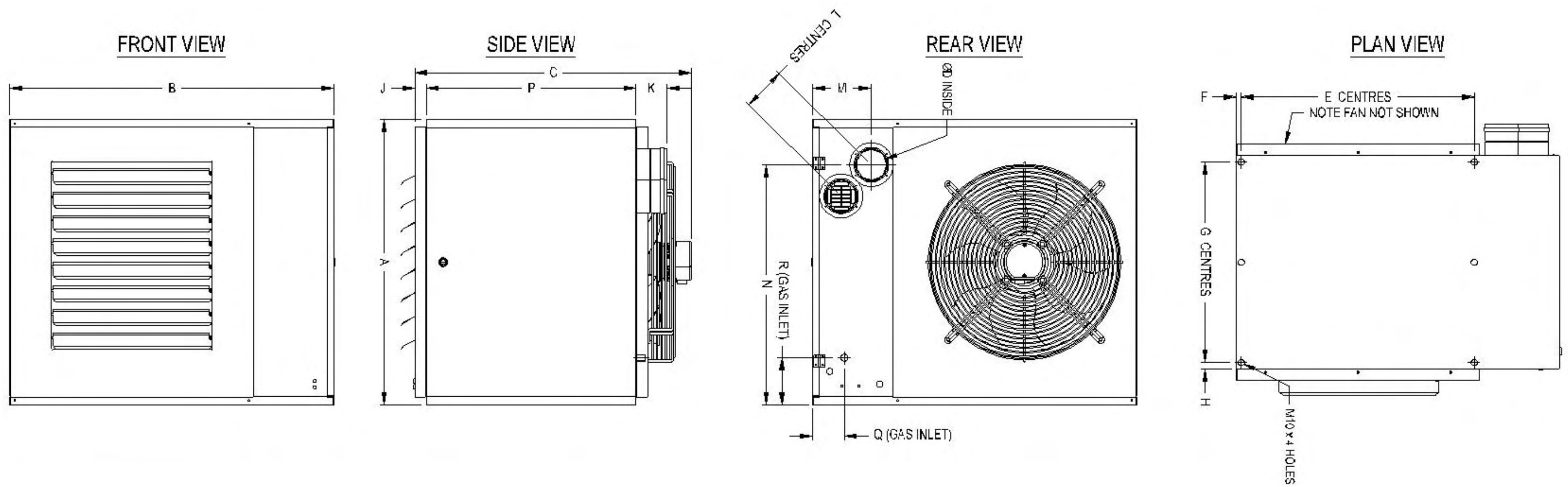
	Heater Size/ Description	12	20	30	42	50	60
	Electrode	33-64-193					
	Ionisation Probe	33-64-194					
	Overheat Red Neon	28-50-030					
	Burner On Green Neon	28-50-038					
	Reset Relay 230V	28-25-039					
	Relay Base	28-25-035					
	High Fire Tim-er Relay	28-15-027					
	MCB	28-07-084 (6A) 28-07-085 (10A) 28-07-046 (16A)					
	Lockout Reset Switch	20-40-118					
	Burner	33-64-158					
	Flue Fan	28-09-082		28-09-083	28-09-084		
	Fan Axial VRA	28-09-057	28-09-058	28-09-059	28-09-061	28-09-062	28-09-092
	Fan Axial VRE	28-09-058	28-09-059	28-09-099	28-09-062	28-09-063	28-09-056
	Fan Centrifugal	28-09-044	28-09-001		28-09-049	28-09-144	28-09-002

Parts list cont'd	**Heater Size/ Description**	**72**	**95**	**120**	**145**
	Gas Valve	28-30-181		N/A	
	Gas Valve	N/A		28-30-184	
	Hi/Low Valve	28-30-188		N/A	
	Hi/Low Valve	N/A		28-30-189	
	Valve Gasket	33-64-227		N/A	
	Valve Flange c/w 'O' Ring	N/A		28-30-185	
	Modulating Valve	28-30-202		28-30-203	
	Modulation Interface Board	28-30-198			
	Control Box	29-01-183			
	Pressure Switch	28-40-163			
	Fan Control Thermostat	28-16-059			
	Limit Stat	28-16-058			
	Overheat Stat	28-60-039			
	Injector Natural Gas	33-64-145			
	Injector Propane Gas	33-64-147			
	Electrode	33-64-193			

Parts list cont'd	**Heater Size/ Description**	**72**	**95**	**120**	**145**
	Ionisation Probe	33-64-194			
	Overheat Red Neon	28-50-030			
	Burner On Green Neon	28-50-038			
	Reset Relay 230V	28-25-039			
	Relay Base	28-25-035			
	High Fire Timer Relay	28-15-027			
	MCB	28-07-084 (6A) 28-07-085 (10A) 28-07-046 (16A)			
	Lockout Reset Switch	20-40-118			
	Burner	33-64-160			
	Flue Fan	28-09-089		28-09-090	
	Fan Axial VRA	28-09-062*	28-09-092*	28-09-056*	
	Fan Axial VRE	28-09-062* 28-09-063*	28-09-097*	28-09-063**	28-09-098***
	Fan Centrifugal	28-09-049*	28-09-149	28-09-043	
	Std Fan Motor	N/A	28-10-117	28-10-015	28-10-120
	Std Fan Belt	N/A	09-16-095	09-16-107	09-16-106
	Contactor/ Overload	N/A		28-11-131/ 28-11-127	28-11-131/ 28-11-128

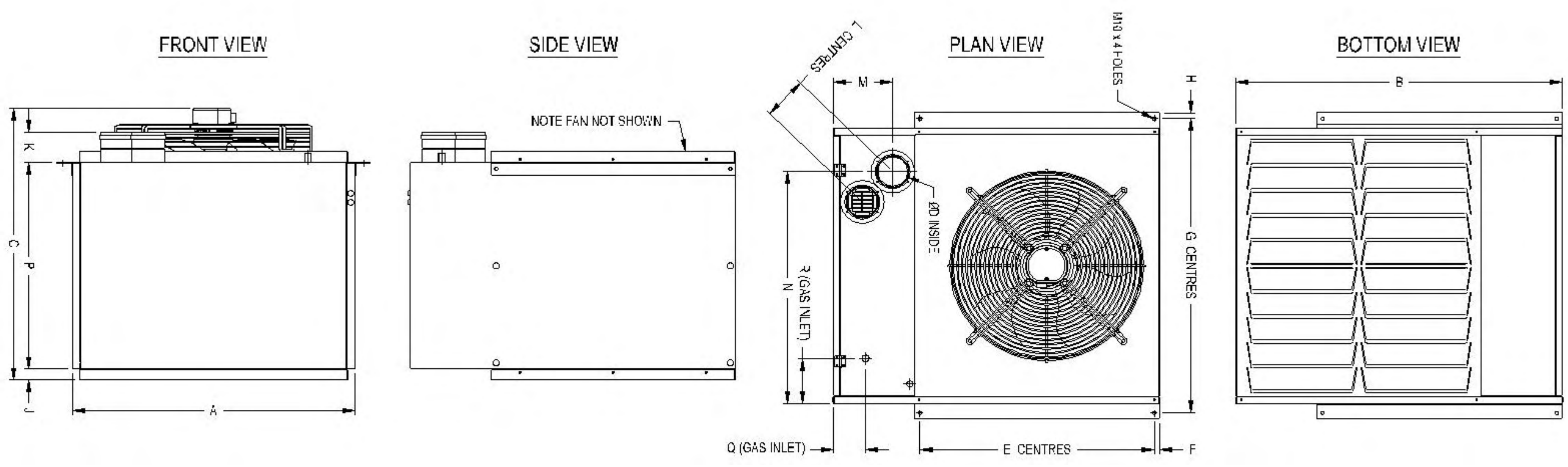
* denotes 2 fans, ** denotes 3 fans, *** denotes 4 fans

9.0 Dimensions - V^2RA



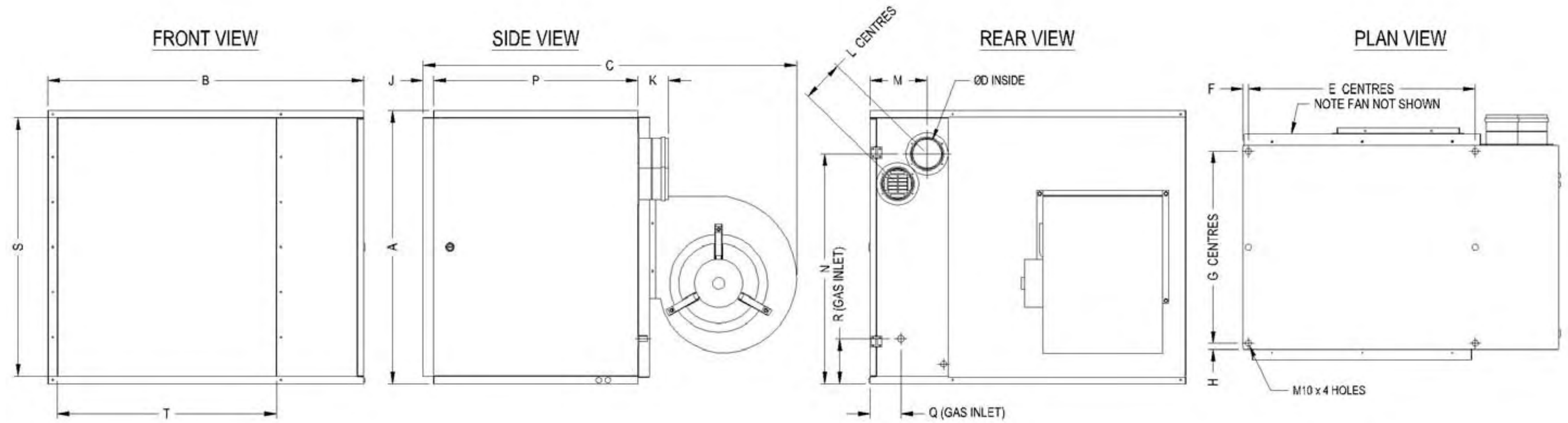
Model	A	B	C Axial	DØ	E	F	G	H	J	K	L	M	N	P	Q	R
12	440	1050	840.5	80	755	17	640	20	36	60	120	192	277.5	680	103	137
20	440	1050	880.5	80	755	17	640	20	36	60	120	192	309	680	103	169
30	545	1050	892.5	100	755	17	640	20	36	100	140	192	394.5	680	103	158
42	650	1050	892.5	100	755	17	640	20	36	100	140	190	507.5	680	103	147
50	780	1050	892.5	100	755	17	640	20	36	100	140	190	636	680	103	148.5
60	910	1050	892.5	100	755	17	640	20	36	100	140	190	765.5	680	103	150
72	650	1750	1022.5	130	1365	17	770	20	36	100	225	256	490	810	95	175
95	800	1750	1022.5	130	1365	17	770	20	36	100	225	256	622	810	95	167
120	980	1750	1022.5	130	1365	17	770	20	36	100	225	256	749	810	95	175
145	1150	1750	1022.5	130	1365	17	770	20	36	100	225	256	935.5	810	95	177

Dimensions - V^{2}RE



Model	A	B	C Axial	DØ	E	F	G	H	J	K	L	M	N	P	Q	R
12	440	1050	840.5	80	755	17	500	20	36	60	120	192	277.5	680	103	137
20	440	1050	880.5	80	755	17	500	20	36	60	120	192	309	680	103	169
30	545	1050	892.5	100	755	17	605	20	36	100	140	192	394.5	680	103	158
42	650	1050	892.5	100	755	17	710	20	36	100	140	190	507.5	680	103	147
50	780	1050	892.5	100	755	17	840	20	36	100	140	190	636	680	103	148.5
60	910	1050	892.5	100	755	17	910	20	36	100	140	190	765.5	680	103	150
72	650	1750	1022.5	130	1365	17	710	20	36	100	225	256	490	810	95	175
95	800	1750	1022.5	130	1365	17	860	20	36	100	225	256	622	810	95	167
120	980	1750	1022.5	130	1365	17	1040	20	36	100	225	256	808	810	95	175
145	1150	1750	1022.5	130	1365	17	1210	20	36	100	225	256	975	810	95	177

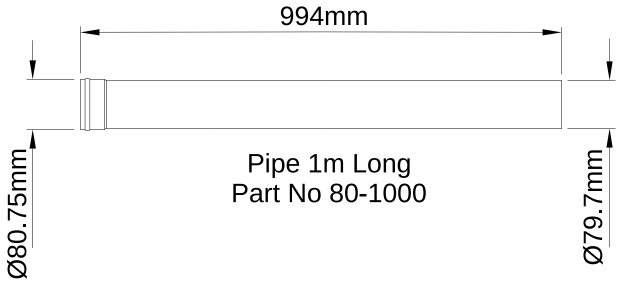
Dimensions - V^2RC



Model	A	B	C Cent	DØ	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
12	440	1050	1133.5	80	755	17	640	20	36	60	120	192	277.5	680	103	137	390	729
20	440	1050	1174.5	80	755	17	640	20	36	60	120	192	309	680	103	169	390	729
30	545	1050	1174.5	100	755	17	640	20	36	100	140	192	394.5	680	103	158	495	729
42	650	1050	1174.5	100	755	17	640	20	36	100	140	190	507.5	680	103	147	600	729
50	780	1050	1245.5	100	755	17	640	20	36	100	140	190	636	680	103	148.5	730	729
60	910	1050	1245.5	100	755	17	640	20	36	100	140	190	765.5	680	103	150	860	729
72	650	1750	1304.5	130	1365	17	770	20	36	100	225	256	490	810	95	175	600	1339
95	800	1750	1375.5	130	1365	17	770	20	36	100	225	256	622	810	95	167	750	1339
120	980	1750	1625	130	1365	17	770	20	36	100	225	256	794	810	95	175	930	1339
145	1150	1750	1625	130	1365	17	770	20	36	100	225	256	935.5	810	95	177	1100	1339

80mm Stainless Steel Flue Fittings.

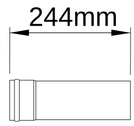
For heater size VR12 - VR20



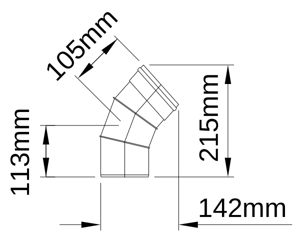
Pipe 1m Long
Part No 80-1000



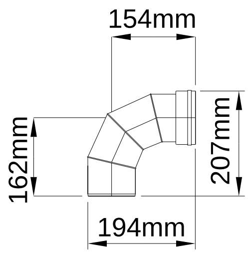
Pipe 0.5m Long
Part No 80-500



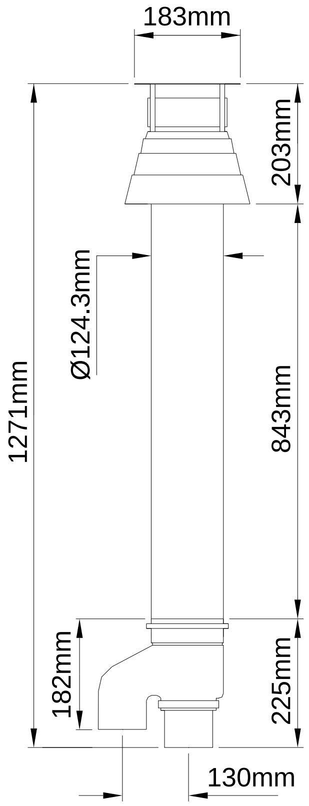
Pipe 0.25m Long
Part No 80-250



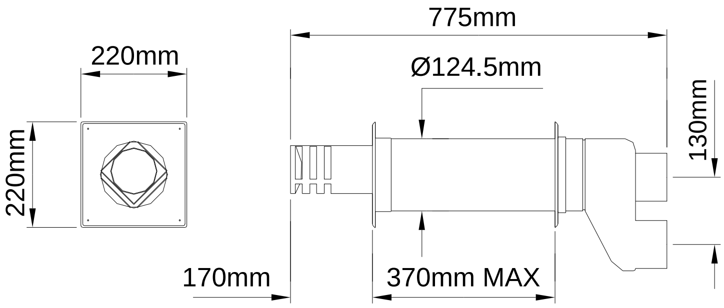
Elbow 45°
Part No 80-45



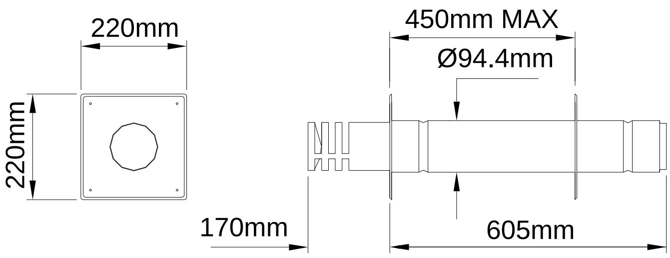
Elbow 90°
Part No 80-90



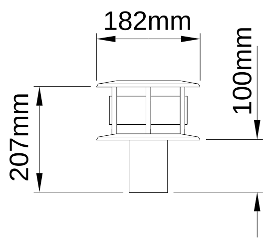
Vertical Concentric Terminal Assembly
Part No V-80



Horizontal Concentric Terminal Assembly
Part No H-80



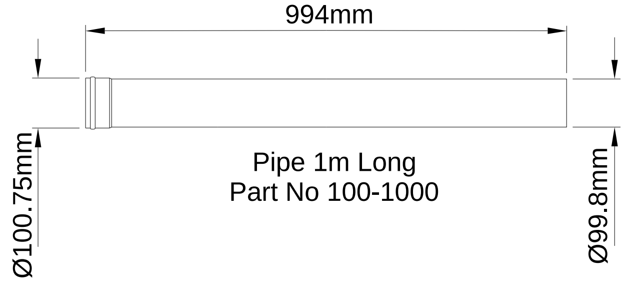
Horizontal Flue Terminal Type B
Part No HC-80



Vertical Flue Terminal
Part No VC-80

100mm Stainless Steel Flue Fittings.

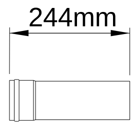
For heater size VR30 - VR60



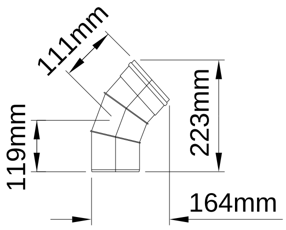
Pipe 1m Long
Part No 100-1000



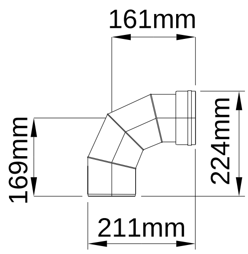
Pipe 0.5m Long
Part No 100-500



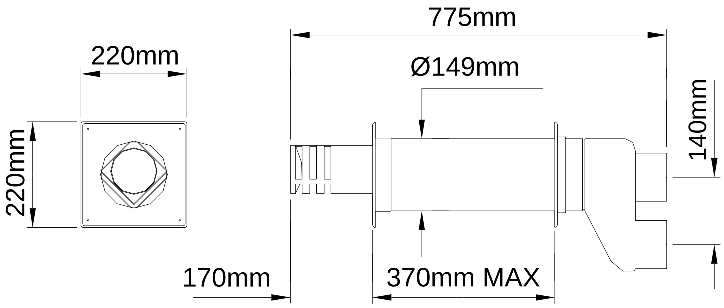
Pipe 0.25m Long
Part No 100-250



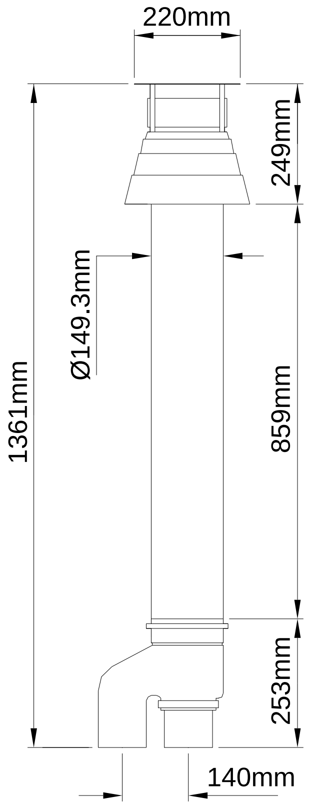
Elbow 45°
Part No 100-45



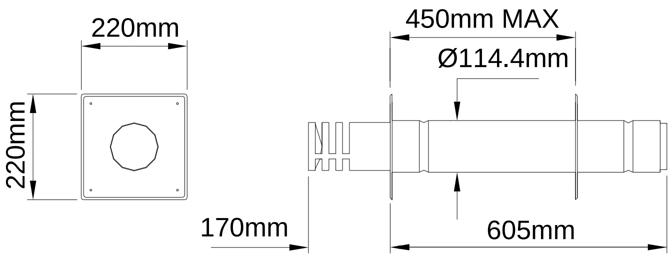
Elbow 90°
Part No 100-90



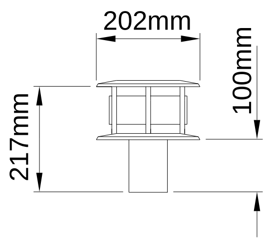
Horizontal Concentric Terminal Assembly
Part No H-100



Vertical Concentric Terminal Assembly
Part No V-100

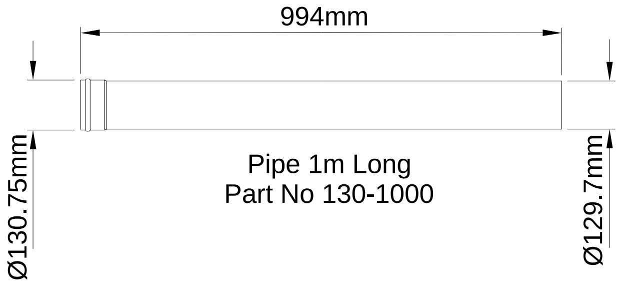


Horizontal Flue Terminal Type B
Part No HC-100



Vertical Flue Terminal
Part No VC-100

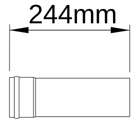
130mm Stainless Steel Flue Fittings.
For heater size VR72 - VR145



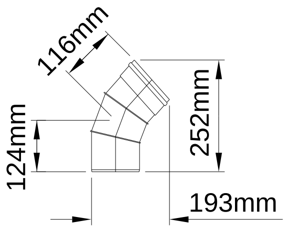
Pipe 1m Long
Part No 130-1000



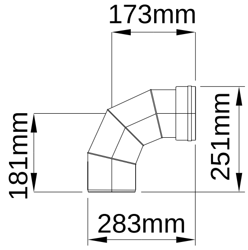
Pipe 0.5m Long
Part No 130-500



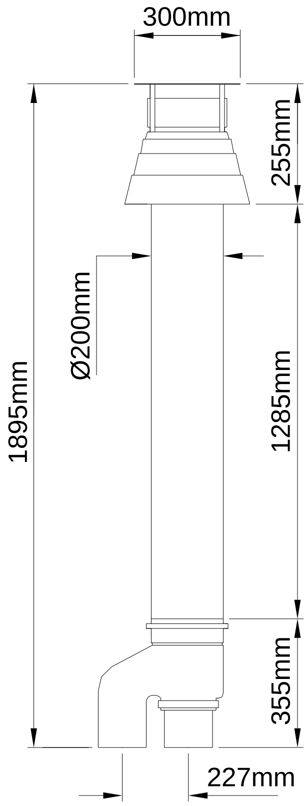
Pipe 0.25m Long
Part No 130-250



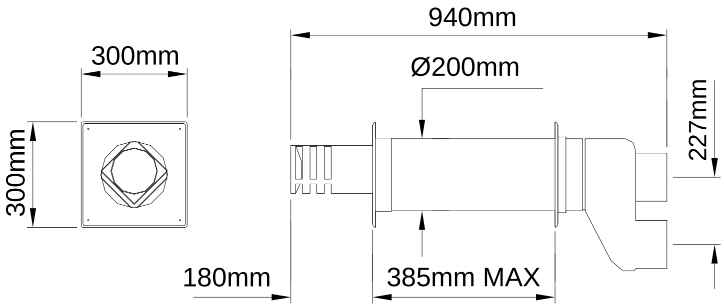
Elbow 45°
Part No 130-45



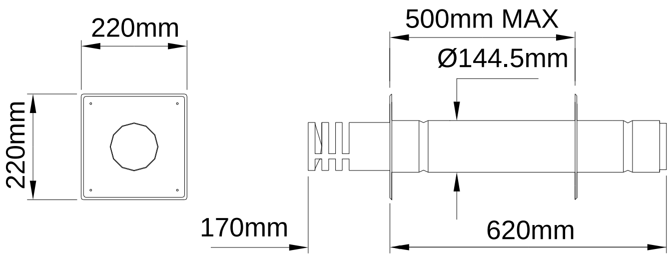
Elbow 90°
Part No 130-90



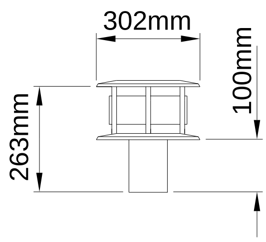
Vertical Concentric Terminal Assembly
Part No V-130



Horizontal Concentric Terminal Assembly
Part No H-130

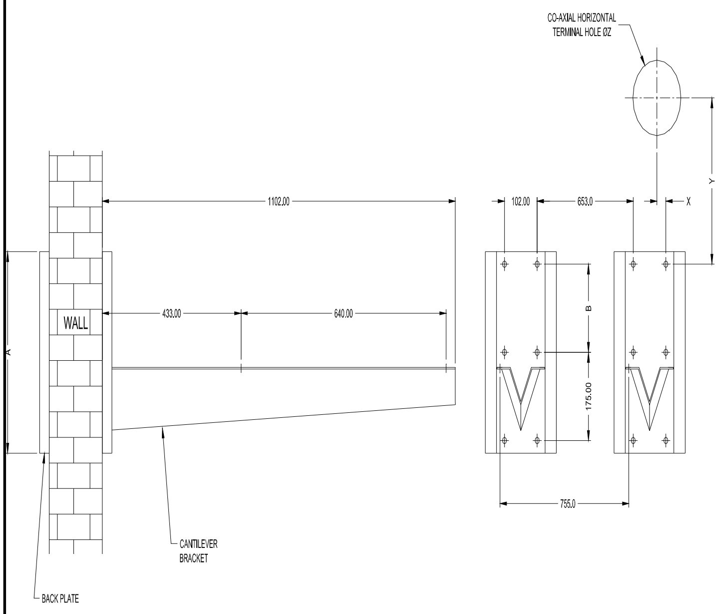


Horizontal Flue Terminal Type B
Part No HC-130



Vertical Flue Terminal
Part No VC-130

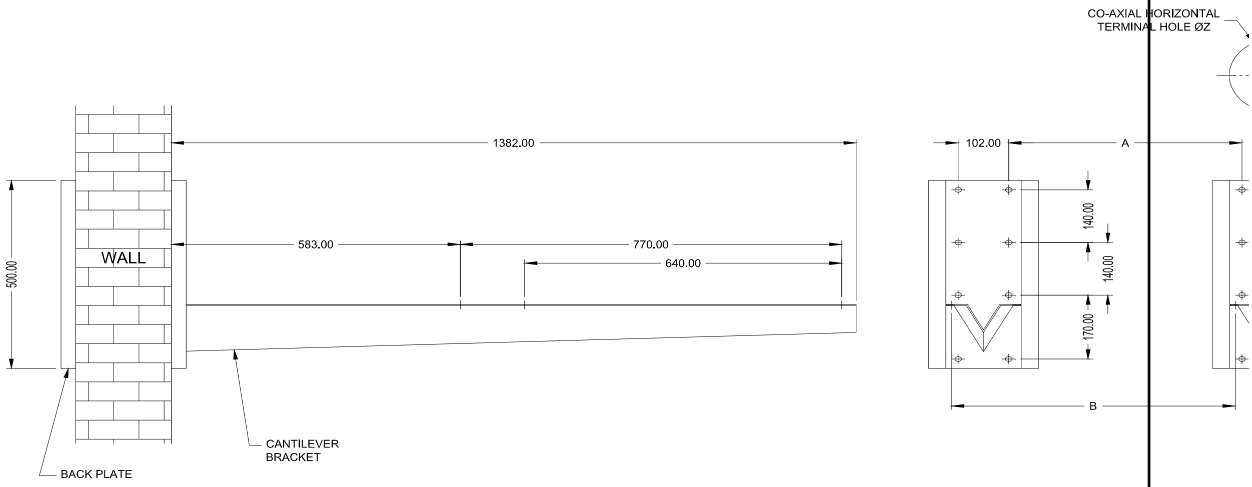
Dimensions - Wall Bracket VRA 12-60



Dimensions in mm

Heater	A	B	X	Y	ØZ
VRA12	330	105	31	142	125
VRA20	330	105	31	174	125
VRA30	400	175	28	191	150
VRA42	400	175	28	300	150
VRA50	400	175	28	430	150
VRA60	400	175	28	560	150

Dimensions - Wall Bracket VRA 72-145 VRC 12-60



Dimensions in mm

Heater	A	B	X	Y	ØZ
VRC12	653	755	31	142	125
VRC20	653	755	31	174	125
VRC30	653	755	28	261	150
VRC42	653	755	28	200	150
VRC50	653	755	28	330	150
VRC60	653	755	28	460	150
VRA72	1263	1365	5	185	200
VRA95	1263	1365	5	317	200
VRA120	1263	1365	7	489	200
VRA145	1263	1365	7	630	200

Document reference number **33-64-695** Apr 2013 issue 12

Technical Support:

Tel: **01384 489 200**
Fax: **01384 489 707**

ambiradgroupsupport@tnb.com
www.ambiradgroup.co.uk

AmbiRad Group
Heating and Ventilation Solutions

AMBIRAD AIRBLOC NORDAIRNICHE BENSON